TOCZYSKI, Tadeusz; MACH, Zdzislaw

Iodine determination in blood. Przegl. lek. Krakow 10 no.12a: 385-387 Dec 54.

1. Z Zakladu pathol. ogolnej i Dosw. A.M. w Krakowie - kierownik prof. dr. B.Giedosz

(BLOOD
iodine determ. methods)
(IODINE, in blood
determ., methods)

MACH, Zdzislaw; TOCZYSKI, Tadeusz

Effect of cortisone on the iodine level in blood. Przegl. lek. Krakow 10 no.12a:391-392 Dec 54.

1. Z zakladu patol. ogolnej i dosw. A.M. w Krakowie - kierownik prof. dr. B.Giedosz.

(CORTISONE, effects
on iodine level in blood)
(BLOOD
iodine level, eff. of cortisone)
(IODINE, in blood
eff. of cortisone)

MACH, Zdzislaw; TOCZYSKI, Tadeusz

Effect of calcium of iodine level in blood. Przegl. lek. Krakow 10 no.12a:389 Dec 54.

1. Z Zakladu patol. ogolnej i dosw. A.M. w Krakowie - kierownik prof. dr. B.Giedosz

(IODINE in blood
  eff. of calcium)
(BLOOD
  iodine level, eff. of calcium)
(CALCIUM, effects
  on iodine level in blood)

MACH, Zdzislaw; TOCZYSKI, Tadeusz

Effect of vitamin D on iodine level in blood. Przegl. lek. Krakow 10 no.12a:390 Dec 54.

1. Z zakladu patol. ogolnej i dosw. A.M. w Krakowie - kierownik prof. dr. B.Giedosz

(IODINE, in blood
  eff. of vitamin D)
(BLOOD
  iodine in, eff. of vitamin D)
(VITAMIN D, effects
  on iodine level in blood)

TOCZYSKI, Tadeusz; MACH, Zdzislaw

Normal iodine quantity in blood of humans in Krakow woiwodship.
Przegl. lek. Krakow 10 no.12a:387 Dec 54.

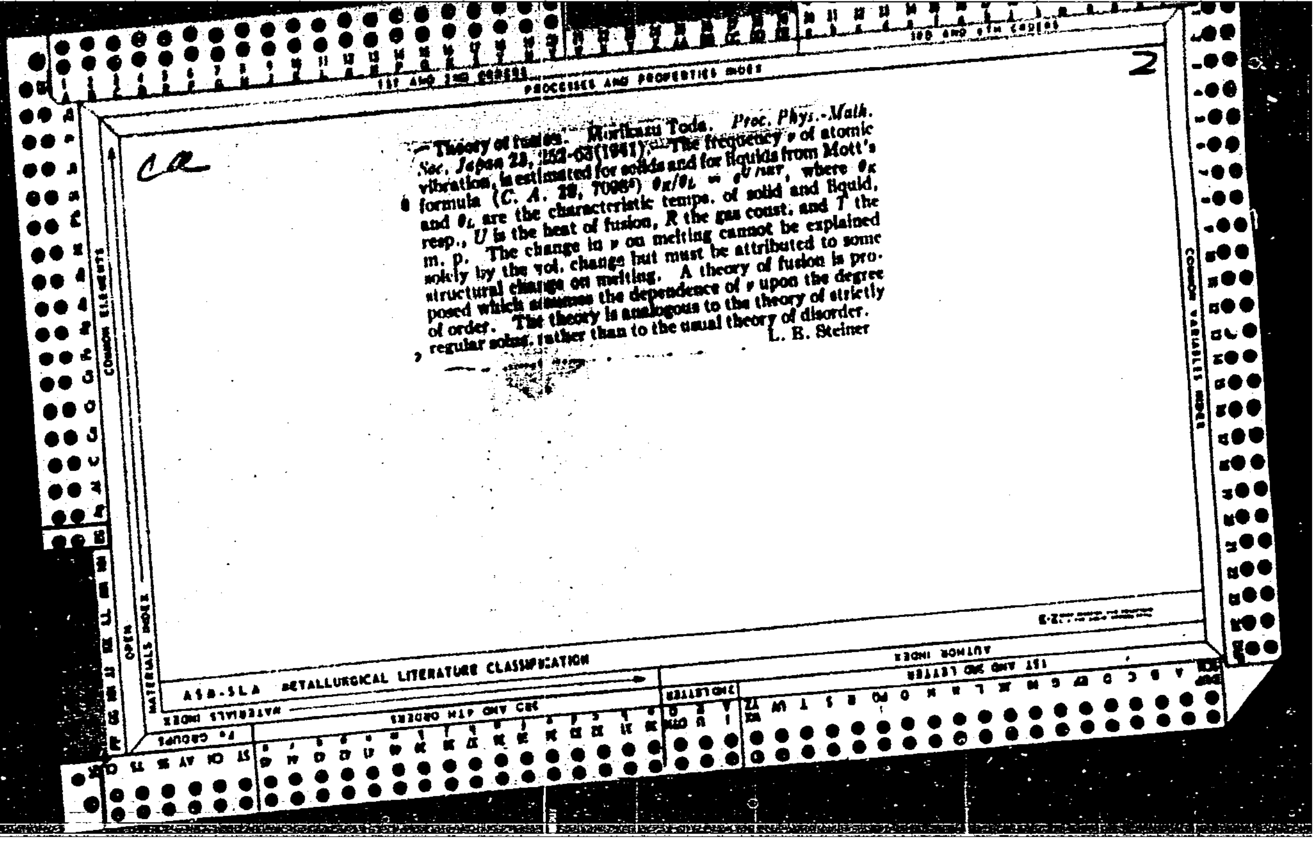
1. Z Zakladu pathol. ogolnej i dosw. A.M. w Krakowie- kierownik
prof. dr. B.Giedosz
(IODINE, in blood
normal quantity, statist. in Poland)
(BLOOD
iodine quantity, normal, statist. in Poland)

MACH, Zdzislaw; TOCZYSKI, Tadeusz

Behavior of iodine in blood in experimental vitamin C deficiency.
Przegl. lek. Krakow 10 no.12a:392-393 Dec 54.

1. Z zakladu patol. ogolnej i dosw. A.M. w Krakowie - kierownik prof. dr. B.Giedosz.

(SCURVY, experimental
iodine level in blood, in guinea pigs)
(IODINE, in blood
in scurvy in guinea pigs)
(BLOOD, in various diseases
scurvy, experimental iodine level in guinea pigs)


2
CA
1ST AND 2ND DIGITS
PROCESSES AND PROPERTIES INDEX
3RD AND 4TH DIGITS
COMMON ELEMENTS
COMMON VARIABLES INDEX
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION
MATERIALS INDEX
3RD AND 4TH ORDERS
AUTHOR INDEX
1ST AND 2ND LETTER
OPEN

Theory of fusion. Morikazu Toda. *Proc. Phys.-Math. Soc. Japan* 23, 252-63(1941).—The frequency ν of atomic vibration is estimated for solids and for liquids from Mott's formula (*C. A.* 29, 7096⁴) $\theta_K/\theta_L = e^{U/nRT}$, where θ_K and θ_L are the characteristic temps. of solid and liquid, resp., U is the heat of fusion, R the gas const. and T the m. p. The change in ν on melting cannot be explained solely by the vol. change but must be attributed to some structural change on melting. A theory of fusion is proposed which assumes the dependence of ν upon the degree of order. The theory is analogous to the theory of strictly regular solns. rather than to the usual theory of disorder.

L. B. Steiner

TOBADZE, B. V.

Nocturnal urine. Gruzmedgiz, 1948. 38 p.

DAFM

1. Urine - Incontinence.

KERESELIDZE, Akakiy Yermolayevich, kand.tekhn.nauk, dotsent; TODADZE, Shorta Aleksandrovich, inzh.; DZHASHI, Dzhumber Romanovich, inzh.; PETRIASHVILI, Georgiy Gavrilovich, inzh.

Operation of a three-phase asynchronous motor fed by a two-phase voltage system. Izv.vys.ucheb.zav.; elektromekh. 5 no.4:378-381 '62. (MIRA 15:5)

1. Rukovoditel' otdela elektricheskikh mashin Tbilisskogo nauchno-issledovatel'skogo elektrotekhnicheskogo instituta (for Kereselidze). 2. Tbilisskiy nauchno-issledovatel'skiy elektrotekhnicheskiy institut (for Todadze, Dzhashi, Petriashvili).
(Electric motors, Induction)

TODAN, N. DR.,

PAVEL, V. Dr.; CZERNIK, I., Dr.; TODAN, N. Dr.

Value and clinical significance of variations in the circulating eosinophil count in cardiac patients. Med. int., Bucur. 10 no.3: 367-370 Mar 58.

1. Lucrare efectuata in Clinica, a II-a medicala I.M.F., Timisoana, (Director prof. Paunescu-Podeanu).

(HEART DISEASE, blood in
eosinophil count, value & clin. significance of variations)

(EOSINOPHIL COUNT, in various dis.
heart dis., value & cling. significance of variations)

TODARITA, C.

"Production per 100 hectares."

p. 17 (Drumul Belsugului) No. 11, Nov. 1957
Bucharest, Rumania

SO: Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 4, April 1958

TODEA, St., ing.

Successes obtained by the mining collective of Jiu Valley in fulfilling the tasks and engagements made at the beginning of 1962. Rev min 13 no.8:355-257 Ag '62.

TODEASA, A.

Country : Rumania E-2

Category : Analytical Chemistry -- Analysis of Inorganic Substances

Abs. Jour : Referat Zhur -- Khim, No 13, 1959, 45500

Author : Todeasa, A., Ciolan, D., Kovacs, A., and Turcanu, C.

Institut. : Not given

Title : The Determination of Iron and Aluminum in Their Binary Mixtures

Orig. Pub. : Rev Chim, 9, No 10, 577-578 (1958)

Abstract : A modified benzoate method (RZhKhim, No 16, 1956, 51122) is used for the determination of Al(3+) in binary mixtures with Fe(3+); the procedure is based on the preliminary separation of Fe(3+) by precipitation as $Fe(OH)_3$ with excess NaOH (rather than reduction to Fe(2+)). The solution to be analyzed, containing Fe(3+) and Al(3+), is diluted with water to 150 ml and heated to boiling, after which an excess of 2N NaOH is added. The $Fe(OH)_3$ precipitate which is formed is filtered, washed

Card: 1/3

Country : Rumania

Category : Analytical Chemistry -- Analysis of Inorganic Substances E-2

Abs. Jour : Referat Zhur -- Khim, No 13, 1959 45500

Author :

Institut. :

Title :

Orig Pub. :

Abstract : with hot water, dissolved in HCl, reprecipitated with ammonia, washed, and ignited to Fe_2O_3. The filtrates and wash solutions are acidified with hydrochloric acid to pH 5-5.5 (in the presence of methyl red), heated, and 20-40 ml of 5% ammonium benzoate solution is added. The solution and the $Al(OH)_3$ precipitate which in formed are allowed to stand for 10-15 min over a water bath, the $Al(OH)_3$ precipitate is filtered, washed with hot solution containing 5 ml of 5% ammonium benzoate solution and in 1 ml conc CH_3COOH [omission?] per 100 ml solution, ignited to Al_2O_3, and weighed.

Card: 2/3

Country : Rumania

Category : Analytical Chemistry -- Analysis of Inorganic Substances E-2

Abs. Jour : Referat Zhur -- Khim, No 13, 1959 45500

Author :

Inst. :

Title :

Orig Pub. :

Abstract : The time required for the filtration and the washing of the $Al(OH)_3$ precipitate is ≤ 30 min; the error in the determination is $\leq 0.6\%$.

P. Manole

Card: 3/3

TODER, I.A., inzh.

Calculating the ultimate carrying capacity of liquid-friction bearings.
Vest.mashinostr. 43 no.3:10-15 Mr '63. (MIRA 16:3)
(Bearings (Machinery))

TODER, I. A., inzh.; DYNKINA, P. P., kand. tekhn. nauk; RUMYANTSEV,
N. I., inzh.

Using polyamide materials for bearings of rolling mills. Vest. mashinostr. 42 no.10:53-56 O '62. (MIRA 15:10)

(Plastic bearings)

KHANOVICH, Miron Grigor'yevich, kand.tekhn.nauk; ALYSHITS, I.Ya., kand. tekhn.nauk, retsenzent; TODER, I.A., inzh., retsenzent; KARATYSHKIN, S.G., prof., doktor tekhn.nauk, red.; VASIL'YEVA, V.P., red.izd-va; FRUMKIN, P.S., tekhn.red.

[Liquid friction and combined supports] Opory zhidkostnogo treniia i kombinirovannye. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit. lit-ry, 1960. 271 p. (MIRA 13:7)

(Bearings (Machinery))

TODER, I.A.

[redacted]

Experimental testing of fluid friction bearings. Proizv. opyt v tiazh.mash. no.3:50-55 '55. (MLRA 10:2)

(Bearings (Machinery)--Testing)

TODER, I.A., inzhener.

Calculating fluid friction bearings used in rolling mills. Proizv.
opyt v tiazh.mash.no.4:35-55 '56. (MLRA 10:2)
(Bearings (Machinery))

TODER, I.A., inzh.

Deformations of parts of fluid-friction bearings. Vest.mash. 41 no.11:36-41 N '61. (MIRA 14:11)
(Bearings (Machinery))

S/122/63/000/003/002/008
A004/A127

AUTHOR: Toder, I.A., Engineer

TITLE: Calculating the limit carrying power of liquid-friction bearings

PERIODICAL: Vestnik mashinostroyeniya, no. 3, 1963, 10 - 15

TEXT: The author presents an approximated solution of the basic hydrodynamic equation of the lubricating theory and equations of the elasticity theory for the deformation of the working surfaces. He points out that this problem is of particular actuality, since just in this case liquid friction in the bearing changes into semi-liquid friction. The initial equations are given, the effect of the geometry of the bearing working surface on the selection of the rated clearance form is shown, and finally the calculation formulae are presented. The relation between the bearing parameters can be expressed in a dimensionless form as follows:

$$\frac{2P\,\psi\,E\,f}{C\,\mu\,uld} = \frac{1}{\eta}\ln\frac{\eta+1}{\eta-1}, \qquad (21)$$

while this relationship between the basic bearing parameters may be easily expressed graphically. There are 7 figures.

Card 1/1

ACCESSION NR: AR5005076 S/0277/64/000/011/0044/0045

SOURCE: Ref zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Otd. vyp., Abs. 11.[illegible]

27
B

AUTHOR: Toder, I. A.

TITLE: Advances in design and construction of heavily loaded liquid friction bearings

CITED SOURCE: Nauchn. tr. Mosk. in-t radioelektroniki i gorn. elektromekhan.,

TOPIC TAGS: bearing, 17 babbit metal, friction, bearing design

TRANSLATION: A calculation method is examined which takes account of specific

L 25365-65
ACCESSION NR: AR5005076

6

is also taken of the simultaneous effect of temperature and pressure, the drop in [illegible]

[illegible]

the unit, eliminating oil streamers which are not supported by the body of a part of the bushing, and the generatrix [illegible]

[illegible]

rigidity of the body, 3) thanks to some change in the technology [illegible]

Card 2/[illegible]

[illegible]

SUB CODE: IE ENCL: 00

Card 3/3

TODER, I.A.

Deformation of the parts of a fluid-friction bearing. Tren. i izn. v mash. no.17:180-204 '62.

Ultimate carrying capacity of a fluid-friction bearing. Ibid.: 205-222 (MIRA 17:10)

ACCESSION NR AP5[illegible] [illegible]/65/000/003/0064/0065

AUTHOR: Toder, I. A., Rumyantseva, N. I., Vlasova, K. N., Nosova, L. A.

[illegible] polyamides in the bearings of rolling mill mechanisms

SOURCE: Plasticheskiye massy, no. 3, 1965, 64-65

TOPIC TAGS: bearing lubricant, [illegible] polyamide film, polyamide lubricant, rolling mill, slide bearing, spray sintering

ABSTRACT: The method of spray sintering was used to coat cast-iron and bronze slide-bearing journals of [illegible] in a '250' rolling mill with polyamde 68, an [illegible] agent with [illegible] strength and a low rate of moisture [illegible] g

[illegible] with 0.12-0.13 mm of atomized polyamide and a surface polyamide layer with [illegible] graphite, molybdenum disulfide, [illegible] to obtain a 0,25-0.4 mm thick

Card 1/2

L [illegible]-65
ACCESSION NR: AP5006570

properties. The service two-layer coating combining adhesive and antifriction properties. The service [illegible] is long as that of uncoated [illegible] journals.

ASSOCIATION: None

SUBMITTED: 00

ENCL: 00

SUB CODE: MT, IE

NO REF SOV: 006

OTHER: 000

Card 2/2

L 24860-66 EWP(e)/EWT(m)/EWP(j)/T/EWP(t)/EWP(k)/ETC(m)-6 IJP(c) JD/WW/HW/DJ/

ACC NR: AT6008957 GS/RM/WH (A) SOURCE CODE: UR/0000/65/000/000/0179/0182

70

68

B+1

AUTHORS: Toder, I. A.; Rumyantsev, N. I.

ORG: none

TITLE: Experience in the use of plastics in slip bearings 15 of some mechanisms of rolling mills 18

SOURCE: Moscow. Institut mashinovedeniya. Plastmassy v podshipnikakh skol'zheniya; issledovaniya, opyt primeneniya (Plastics in friction bearings; research and experiment in application). Moscow, Izd-vo Nauka, 1965, 179-182

TOPIC TAGS: plastic coating, antifriction bearing, polyamide, lubricant filler additive, adhesion, rolling mill, fluid friction, lubricating oil/ P-28 lubricating oil, 30 lubricating oil

ABSTRACT: Several types of bushings with thin coatings of caprone 15 and polyamide-68 in pure form and with fillers were tested. Molybdenum disulfide (1--5 wt %) and powdered lead (30--60 wt %) were used as the filler. The bushings were tested on a stand under a pressure $p \leq 250$ kg/cm^2 and velocity $v = 0.05$--10 m/sec. The lubricants were P-28 oil and turbine oil 30. The main reasons for the bushing failures were: destruction of the coating by overheating and peeling of the

Card 1/2

L 24860-66

2

ACC NR: AT6008957

coating from the ends after 40--50 hrs of operation. Experimental bushings with a diameter of 300 mm and a polyamide coating with a thickness of 2 mm were tested. These operated for 850 hrs. It was found that a large amount of filler greatly reduced adhesion of the polyamide to the metal. Graphite was also used as a filler. The use of a solid lubricant greatly improves the friction conditions. Orig. art. has: 2 diagrams and 1 table.

SUB CODE: 11/ SUBM DATE: 31Jul65

Card 2/2 dda

TODERICIU, D.

Contributions to the history of the discovery of methane gas in Rumania. Petrol si gaze 13 no.6:285-288 Je '62.

TODERICIU, Dumitru, ing.

The rocket in stages, a Rumanian creation in the 16th century. Rev. transport 11 no.8:376-380 Ag'64

TODERICIU, D.

"Auraria Romano-Dac[illegible] by Samuel Köleseri. Reviewed by D. Todericiu. Rev chimie Min petr 12 no.11:663 N '61.

TODERICIU, D.

Chemists of Bucharest in the 18th century. Rev chimie Min petr 13 no.2:110-111 F '62.

TODERICIU, D.

Contributions to the salt exploitation history in Rumania. Rev min 14 no.3:136-137 Mr '63.

TODERICIU, D.

From the chronicle of Rumanian crude oil. Petrol si gaze 13 no.9:425-426 S '62.

TODERICIU, D.

Contribution to the history of Rumanian oil. Petrol si gaze 13 no.10: 467-468 O '62.

TODERICIU, D.

The first book on Rumanian practical chemistry. Rev chimie Min petr 1, no.9:561-562 S '62.

TODERICIU, D.

Looking through the chronicles of Rumanian chemistry. Rev chimie Min petr 12 no.10:622-623 O '61.

TODERICIU, D., ing.

Dimitrie Cantemir, a precursor of some theories in chemistry. Rev chimie Min petr 12 no.7:399-402 Jl '61.

TODERICIU, D.

Contributions to the Iconography of the History of Chemistry in Rumania. Rev chimie Min petr 13 no.7:438 Jl '62.

TODERICIU, D.

From the history of Rumanian oil. Petrol si gaze 13 no.8:383 Ag '62.

TODERICIU, D.

Moldavian potassium factories in the 17th century. Rev chimie Min petr 13 no.10:623-625 O '62.

TODERICIU, D.

From the history of salt mining. Rev min 13 no.3:127-128
Mr '62.

TODERICIU, D.

Ioannes Fridvalski, a great Transylvanian chemist. Rev chimie Min petr 13 no.1:33-35 Ja '62.

TODERICIU,D., ing.

From papyrus to modern paper. Cel hirtie 11 no.3:113-117 Mr. '62.

TODERICIU,D., ing.

Paper filigree manufactured during the period 1539-1841. Cel hirtie 11 no.8:302-305 Ag'62.

TODERICIU, D.

"Living fire" by D. Moroianu, I.M. Stefan. St si Teh Buc 15 no.11:38-39 N '63.

TODERICIU, D.

TECHNOLOGY

PERIODICAL: CELULOZA SI HIRTIE. Vol. 7, no. 12, Dec. 1958

TODERICIU, D. Great prospects for the development of the USSR national economy in the period 1959-1965. p. 466.

Monthly List of East European Accessions (EEAI) LC, Vol. 8, No 4
April, 1959, Unclass

Todericiu, D.

Structure of proteins. D. Todericiu. *Rev. chim* (Bucharest) 5, 59-64(1954).—A review of recent contributions, primarily Russian, to the structure study of proteins.

MD

Gerard Auflеger

CA

24

Possible mechanism for the three limits of inflammation in the oxidation of hydrocarbons. O. M. Todes. *J. Phys. Chem.* (U. S. S. R.) 4, 18-32(1933).—Theoretical. The explosion regions are detd. by maxima of the function dQ/dt (t = time). T. assumes that between the limits p_2 and p_3 at least two related reactions proceed, the one leading to explosion at higher pressures here only serving to prevent the working out of the first, which leads to explosion at lower pressures. F. H. RATHMANN

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

24

reduced by keeping the relative humidity above 50%. R. K. MAIN

The heat theory of explosion. I. O. M. Todes. *J. Phys. Chem.* (U. S. S. R.) 4, 78–81(1933); cf. *C. A.* 26, 5820.—Theoretical. Only by considering the diam. of the vessel and the thickness of the walls can decision be made between the heat and the chain theories of explosions. The equation $p_k d = c$ is derived on the basis of heat transmission by convection. II. T. A. Kontorova and O. M. Todes. *Ibid.* 81–91.—Under the condition $\delta/d = k$ (δ = wall thickness, d = diam. of vessel) the equation $p_k d = c$ (p_k = critical explosion pressure) holds for available data. The postulated mechanism leads to quite different results from those of the chain theory. F. H. R.

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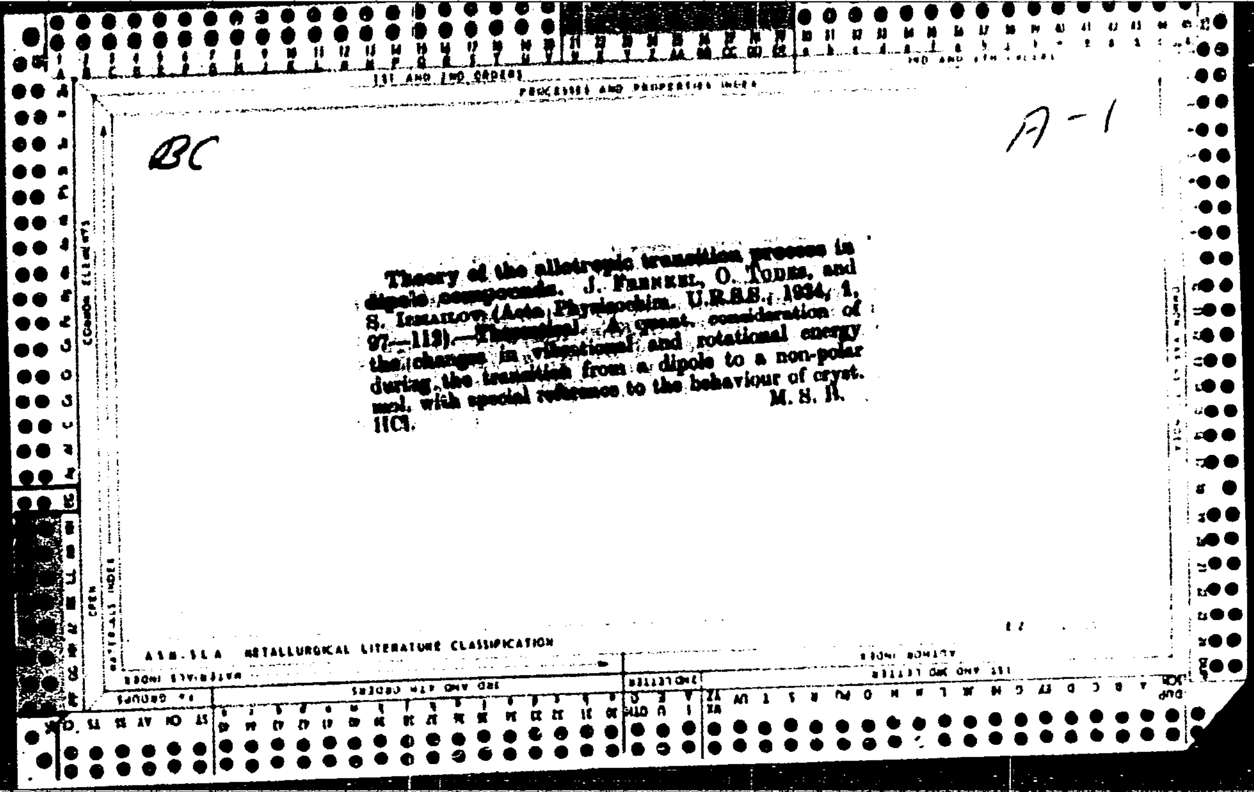
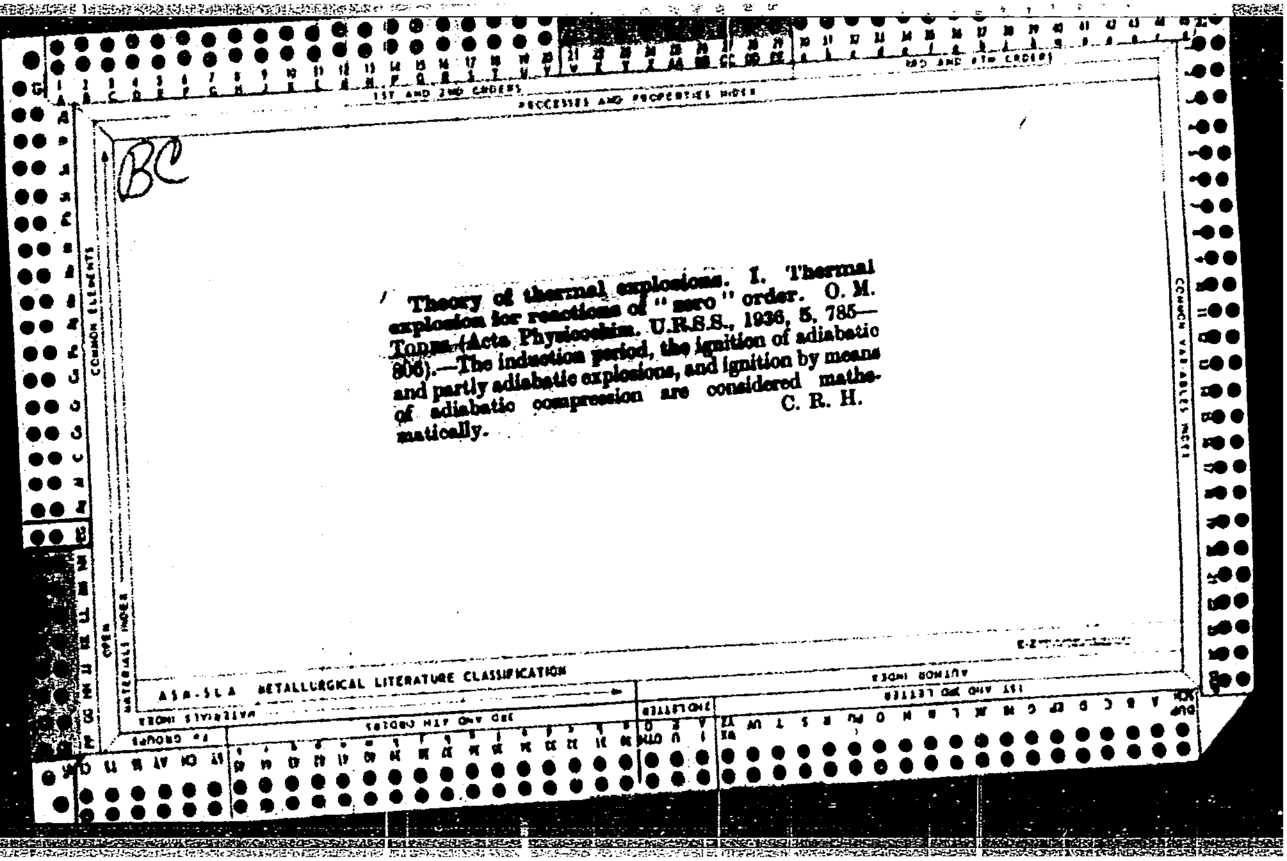


1ST AND 2ND ORDERS
PROCESSES AND PROPERTIES INDEX
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION
MATERIALS INDEX
3RD AND 4TH ORDERS
OPEN

BC

A-1

Theory of the allotropic transition process in dipole compounds. J. FRENKEL, O. TODES, and S. ISMAILOV (Acta Physicochim. U.R.S.S., 1934, 1, 97—112).—Theoretical. A quant. consideration of the changes in vibrational and rotational energy during the transition from a dipole to a non-polar mol., with special reference to the behaviour of cryst. HCl.
M. S. B.


1ST AND 2ND ORDERS
PROCESSES AND PROPERTIES INDEX
3RD AND 4TH ORDERS
COMMON ELEMENTS
COMMON VARIABLES INDEX
MATERIALS INDEX
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION
AUTHOR INDEX
1ST AND 2ND LETTER
3RD AND 4TH GROUPS

BC

Theory of thermal explosions. I. Thermal explosion for reactions of "zero" order. O. M. Todes (Acta Physicochim. U.R.S.S., 1936, 5, 785—806).—The induction period, the ignition of adiabatic and partly adiabatic explosions, and ignition by means of adiabatic compression are considered mathematically. C. R. H.

PROCESSES AND PROPERTIES INDEX

24

Thermal decomposition and explosion of methyl nitrate vapors. A. Appin, O. Todes and Yu. Khariton. *J. Phys. Chem.* (U. S. S. R.) **8**, 866-82(1936).—At 210-40° and 5-15 mm. the thermal decompn. of Me nitrate is unimol. according to the kinetic equation $K = 2.5 \times 10^{14}$[illegible]/RT and the chem. equation $CH_3ONO_2 \rightarrow \frac{1}{2}CH_2O + \frac{1}{2}CH_3OH + NO_2$. Above 240° more complete decompn. takes place and between 256° and 324° explosion with an induction period follows the equations $CH_3ONO_2 \rightarrow CH_2O + \frac{1}{2}H_2O + \frac{1}{2}NO_2 + \frac{1}{2}NO$ and $CH_3ONO_2 \rightarrow \frac{1}{2}CH_2O + H_2O + \frac{1}{2}CO + NO$. From the change in the inflammation period as a function of *p* and *T*, of surface area and of the addn. of such substances as NO_2, it is concluded that the explosion is in accord with the thermal theory of explosions developed by N. N. Semenov (cf. *C. A.* **25**, 5002). F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

TODES408M8

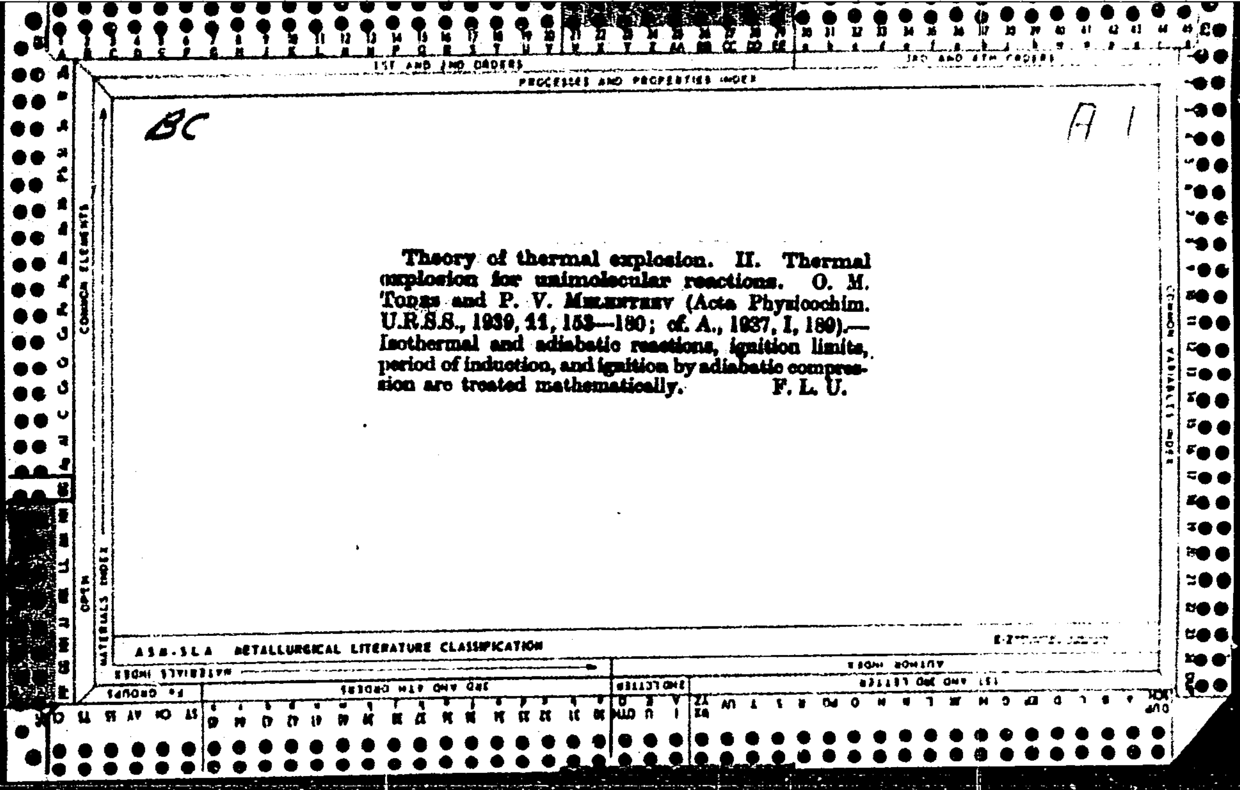
600

1. TODES, O.M.

2. USSR (600)

"The Theory of Heat Explosion" Part I. "The Heat Explosion of a 'Zero' Order Reaction", Zhur. Fiz. Khim., 13, No. 7, 1939, Leningrad, Inst. of Chemical Physics. Received 13 Dec 1938.

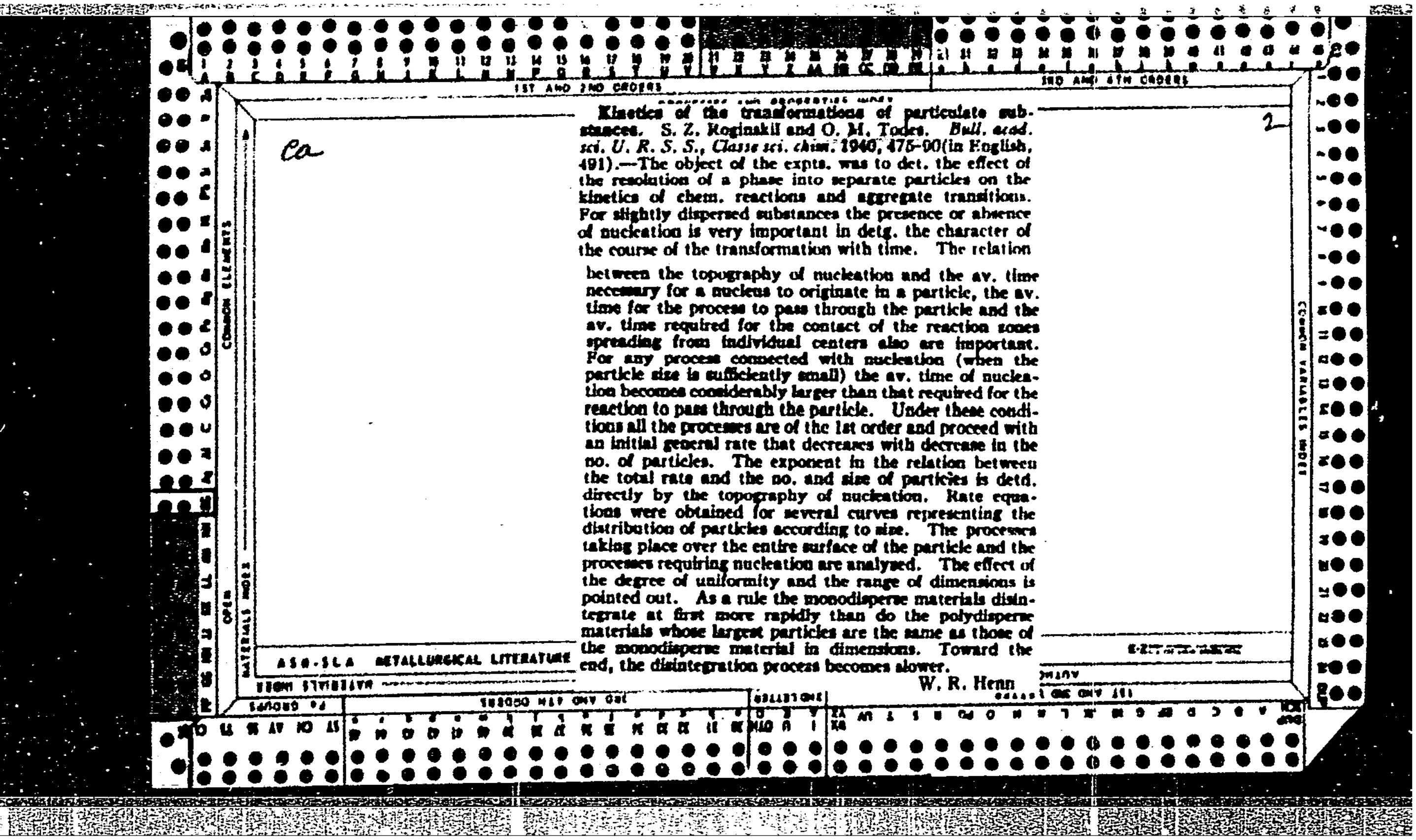
9. [redacted] Report U-1615, 3 Jan 1952.


1ST AND 2ND ORDERS
3RD AND 4TH ORDERS
PROCESSES AND PROPERTIES INDEX
COMMON ELEMENTS
OPEN
MATERIALS INDEX
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION
AUTHOR INDEX
1ST AND 2ND LETTER
2ND LETTER
3RD AND 4TH ORDERS
MATERIALS INDEX
F4 GROUPS

BC

A 1

Theory of thermal explosion. II. Thermal explosion for unimolecular reactions. O. M. Todes and P. V. Melentjev (Acta Physicochim. U.R.S.S., 1939, 11, 153—180; cf. A., 1937, I, 189).—Isothermal and adiabatic reactions, ignition limits, period of induction, and ignition by adiabatic compression are treated mathematically. F. L. U.



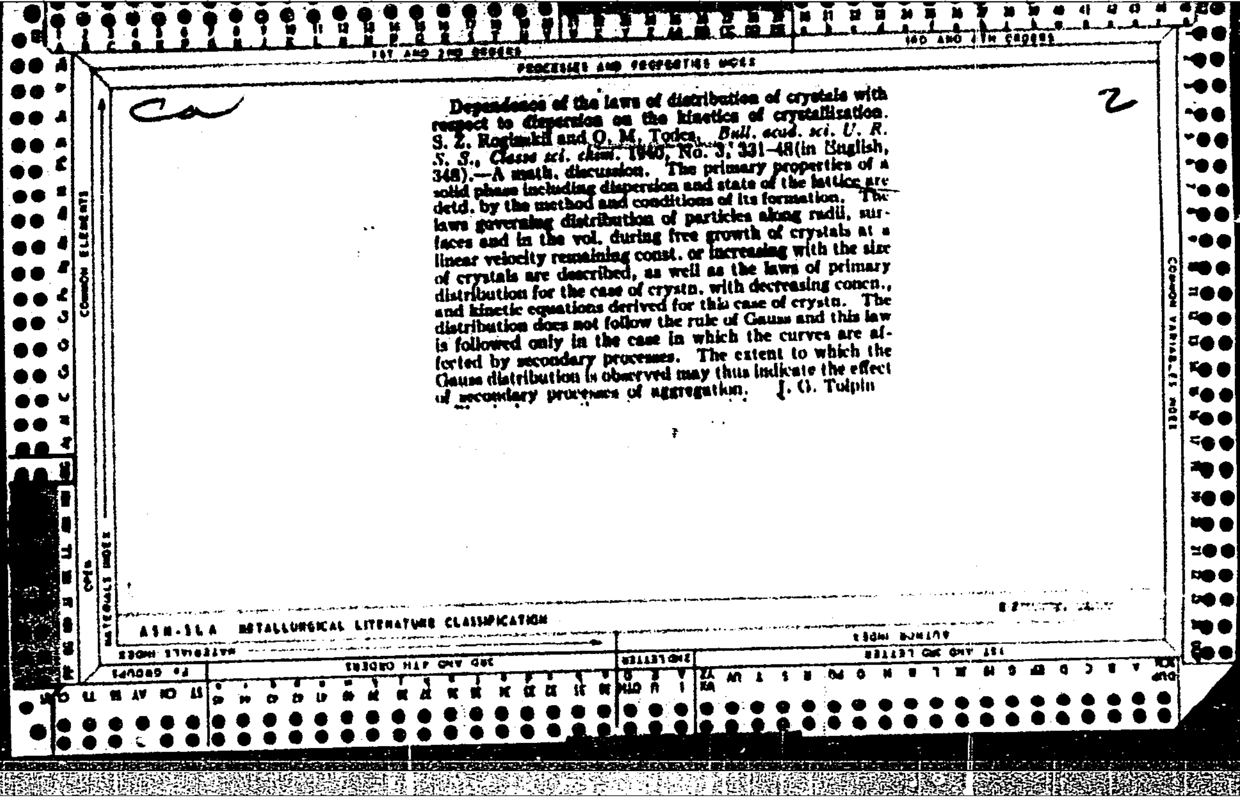
1ST AND 2ND ORDERS
3RD AND 4TH ORDERS
PROCESSES AND PROPERTIES INDEX
COMMON ELEMENTS
MATERIALS INDEX
OPEN
ASM-SLA METALLURGICAL LITERATURE

Ca

2

Kinetics of the transformations of particulate substances. S. Z. Roginskii and O. M. Todes. *Bull. acad. sci. U. R. S. S., Classe sci. chim.* 1940, 475-90(in English, 491).—The object of the expts. was to det. the effect of the resolution of a phase into separate particles on the kinetics of chem. reactions and aggregate transitions. For slightly dispersed substances the presence or absence of nucleation is very important in detg. the character of the course of the transformation with time. The relation between the topography of nucleation and the av. time necessary for a nucleus to originate in a particle, the av. time for the process to pass through the particle and the av. time required for the contact of the reaction zones spreading from individual centers also are important. For any process connected with nucleation (when the particle size is sufficiently small) the av. time of nucleation becomes considerably larger than that required for the reaction to pass through the particle. Under these conditions all the processes are of the 1st order and proceed with an initial general rate that decreases with decrease in the no. of particles. The exponent in the relation between the total rate and the no. and size of particles is detd. directly by the topography of nucleation. Rate equations were obtained for several curves representing the distribution of particles according to size. The processes taking place over the entire surface of the particle and the processes requiring nucleation are analysed. The effect of the degree of uniformity and the range of dimensions is pointed out. As a rule the monodisperse materials disintegrate at first more rapidly than do the polydisperse materials whose largest particles are the same as those of the monodisperse material in dimensions. Toward the end, the disintegration process becomes slower.

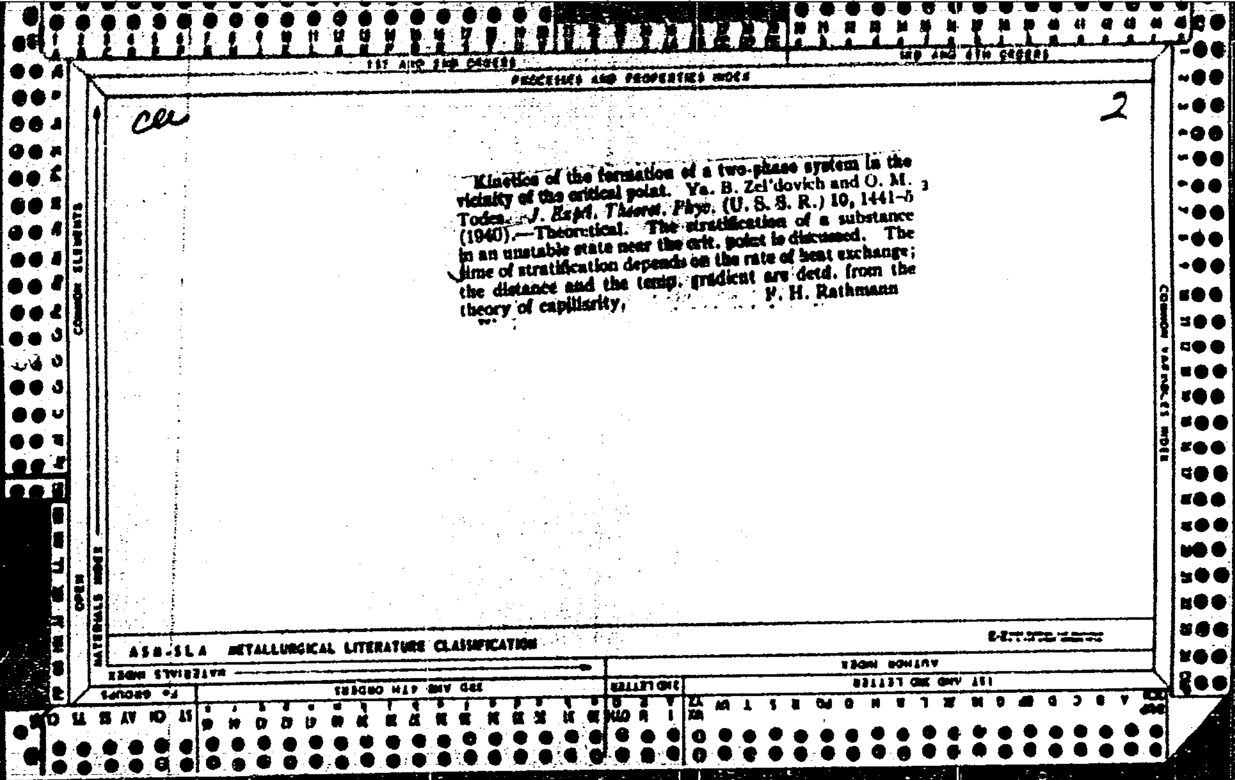
W. R. Henn


1ST AND 2ND ORDERS
3RD AND 4TH ORDERS
PROCESSES AND PROPERTIES INDEX
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Ca

2

Dependence of the laws of distribution of crystals with respect to dispersion on the kinetics of crystallization. S. Z. Roginskii and O. M. Todes. *Bull. acad. sci. U. R. S. S., Classe sci. chim.* 1940, No. 3, 331-48 (in English, 348).—A math. discussion. The primary properties of a solid phase including dispersion and state of the lattice are detd. by the method and conditions of its formation. The laws governing distribution of particles along radii, surfaces and in the vol. during free growth of crystals at a linear velocity remaining const. or increasing with the size of crystals are described, as well as the laws of primary distribution for the case of crystn. with decreasing concn., and kinetic equations derived for this case of crystn. The distribution does not follow the rule of Gauss and this law is followed only in the case in which the curves are affected by secondary processes. The extent to which the Gauss distribution is observed may thus indicate the effect of secondary processes of aggregation. J. O. Tulpin



1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

Ca

2

Kinetics of the formation of a two-phase system in the vicinity of the critical point. Ya. B. Zel'dovich and O. M. Todes. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 10, 1441-5 (1940).—Theoretical. The stratification of a substance in an unstable state near the crit. point is discussed. The time of stratification depends on the rate of heat exchange; the distance and the temp. gradient are detd. from the theory of capillarity. F. H. Rathmann

3

COMMON ELEMENTS

OPEN

MATERIALS INDEX

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

AUTHOR INDEX

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

BC

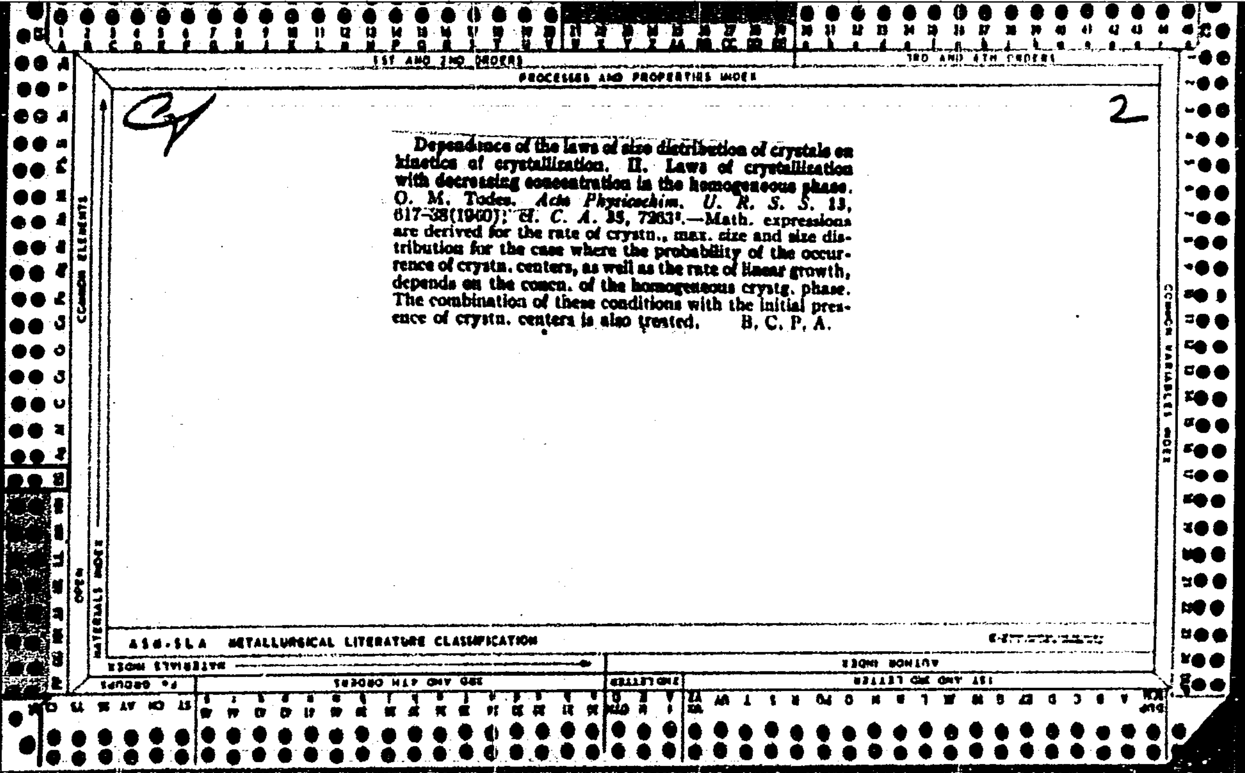
A1

Dependence of the law of size distribution of crystals on kinetics of crystallisation. I. Dispersion statistics for free growth. S. Roginski and O. Todes (*Acta Physicochim. U.R.S.S.*, 1940, 12, 531—558).—On the basis of kinetic equations for the free growth of crystals (cf. A., 1939, I, 616) expressions are derived for the size distribution, according to radius, surface, or vol., of primary cryst. particles. Except for the case where nucleus formation and growth are affected by decreasing concn., the distribution curves in general exhibit no max., and differ completely from those for a Gaussian distribution. The occurrence of the latter in some actual systems is due to secondary processes such as aggregation of primary particles. F. L. U.

COMMON ELEMENTS

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

2

Dependence of the laws of size distribution of crystals on kinetics of crystallization. II. Laws of crystallization with decreasing concentration in the homogeneous phase. O. M. Todes. *Acta Physicochim. U. R. S. S.* 13, 617-38(1940); cf. *C. A.* 35, 7263^1.—Math. expressions are derived for the rate of crystn., max. size and size distribution for the case where the probability of the occurrence of crystn. centers, as well as the rate of linear growth, depends on the concn. of the homogeneous crystg. phase. The combination of these conditions with the initial presence of crystn. centers is also treated. B. C. P. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

CA

2

Kinetics of transformation of "parcelled" bodies. S. Z. Roginskii and O. M. Todes. *Acta Physicochim. U. R. S. S.* 13, 803-28(1940).—See *C. A.* 35, 1298^{7}.

F. H. Rathmann

COMMON ELEMENTS

OPEN

MATERIALS INDEX

COMMON VARIABLES INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

MATERIALS INDEX

AUTHOR INDEX

3RD AND 4TH ORDERS

1ST AND 2ND LETTER

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

CA

21

Theory of thermal explosions. III. Thermal explosion for autocatalytic reactions. O. M. Todes and P. V. Melent'ev. *J. Phys. Chem.* (U. S. S. R.) 14, 1036-42(1940); *Acta Physicochim. U. R. S. S.* 14, 27-52(1941); cf. *C. A.* 34, 3495^1.—Theoretical-math. T. and M. discuss isothermal and nearly isothermal reactions, the limits of inflammation, adiabatic reactions and explosions, and inflammation by adiabatic compression. The condition for self-inflammation and for normal kinetics is the same when the initial isothermal rate of reaction is replaced by the max. rate of reaction. F. H. Rathmann

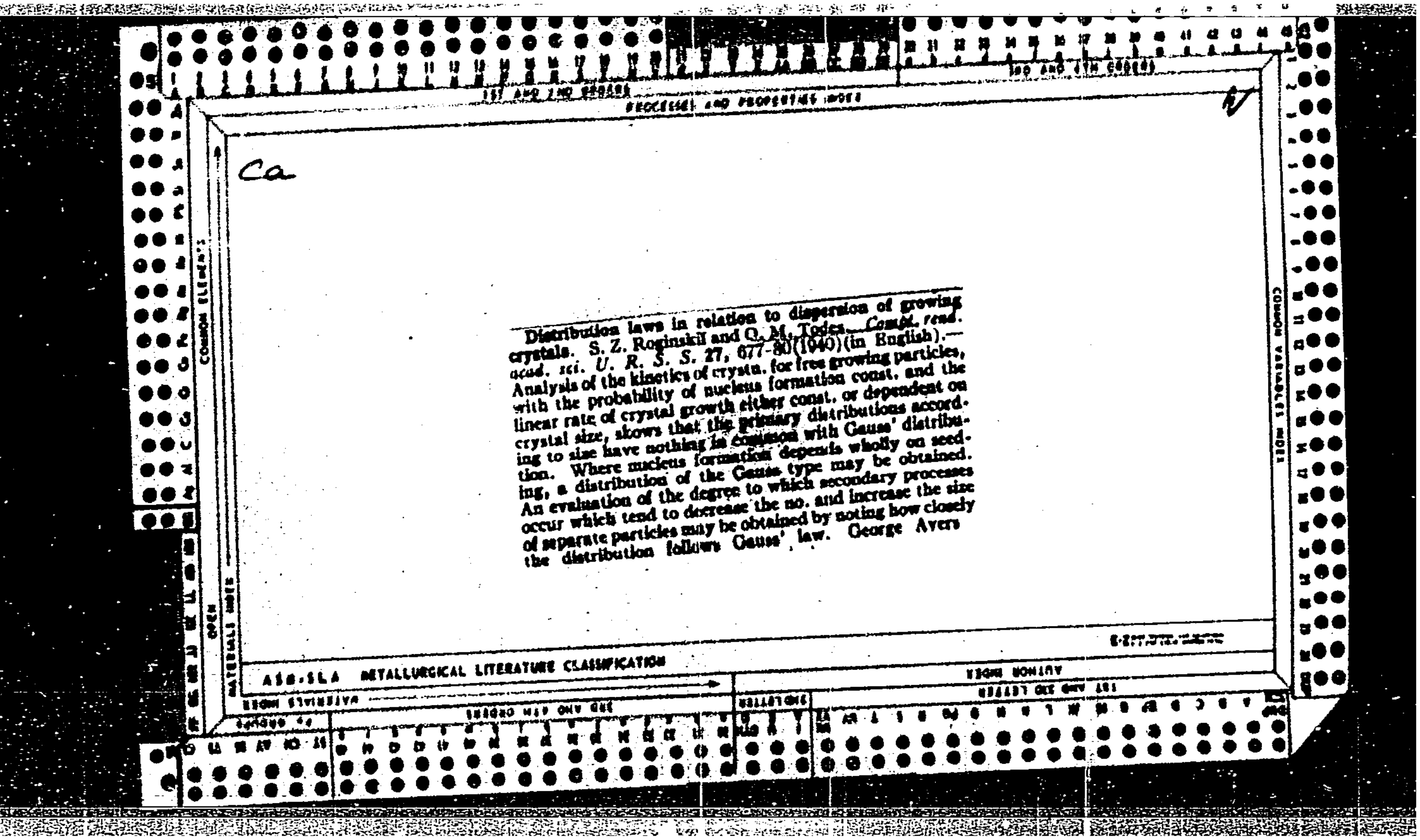
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

TODEA, O. M., KARANDIN, B. N.

Leningrad Institute of Physical Chemistry, (-1940-)

"The Theory of Thermal Explosion" IV. "Study of Heat Evolution in Closed Containers in order to Establish the Explosive Constant"

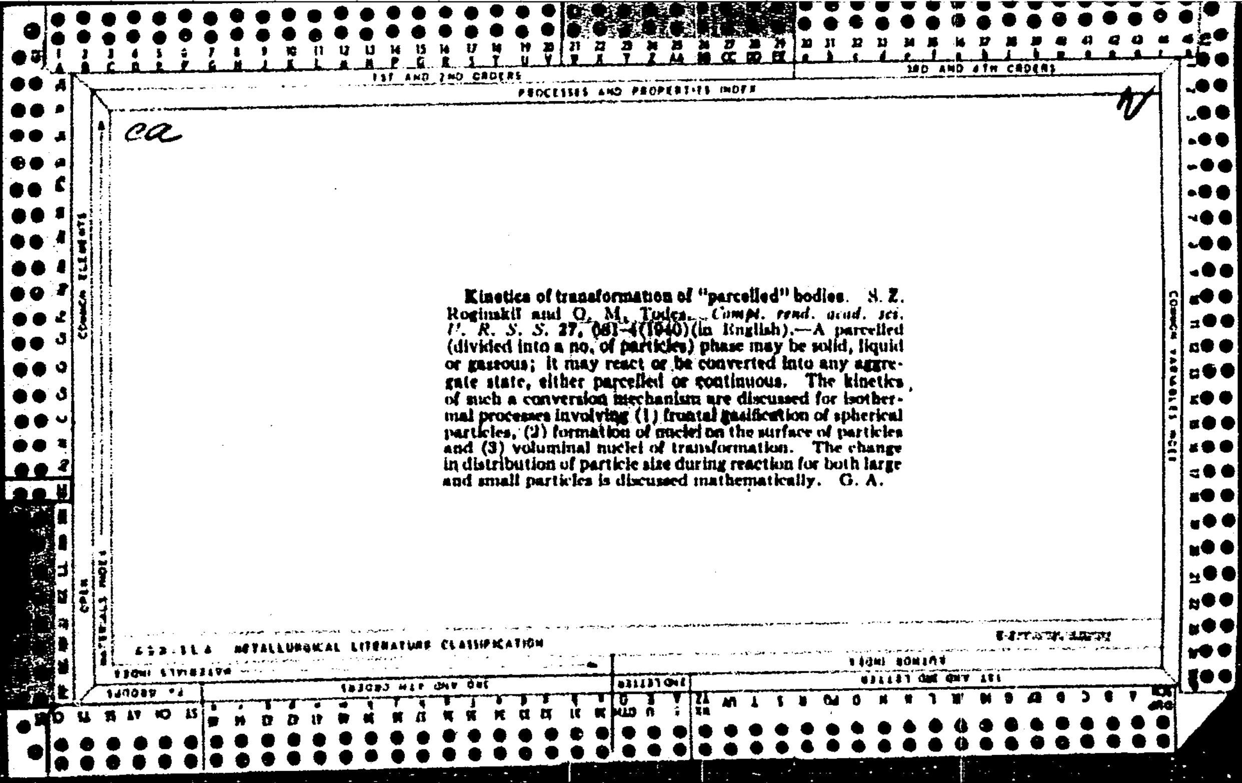
Zhur. Fix. Khim., Vol. 14, No. 11, 1940.


1ST AND 2ND ORDERS
PROCESSES AND PROPERTIES INDEX
3RD AND 4TH ORDERS
COMMON ELEMENTS
COMMON VARIABLES INDEX
MATERIALS INDEX
AUTHOR INDEX
1ST AND 2ND LETTER

Ca

Distribution laws in relation to dispersion of growing crystals. S. Z. Roginskii and O. M. Todes. *Compt. rend. acad. sci. U. R. S. S.* 27, 677-80 (1940) (in English).—Analysis of the kinetics of crystn. for free growing particles, with the probability of nucleus formation const. and the linear rate of crystal growth either const. or dependent on crystal size, shows that the primary distributions according to size have nothing in common with Gauss' distribution. Where nucleus formation depends wholly on seeding, a distribution of the Gauss type may be obtained. An evaluation of the degree to which secondary processes occur which tend to decrease the no. and increase the size of separate particles may be obtained by noting how closely the distribution follows Gauss' law. George Avers

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



1ST AND 2ND ORDERS
PROCESSES AND PROPERTIES INDEX
3RD AND 4TH ORDERS
ASA-SLA METALLURGICAL LITERATURE CLASSIFICATION

ca

N

Kinetics of transformation of "parcelled" bodies. S. Z. Roginskii and O. M. Todes. *Compt. rend. acad. sci. U. R. S. S.* **27,** 681-4(1940)(in English).—A parcelled (divided into a no. of particles) phase may be solid, liquid or gaseous; it may react or be converted into any aggregate state, either parcelled or continuous. The kinetics of such a conversion mechanism are discussed for isothermal processes involving (1) frontal gasification of spherical particles, (2) formation of nuclei on the surface of particles and (3) voluminal nuclei of transformation. The change in distribution of particle size during reaction for both large and small particles is discussed mathematically. G. A.

A.E.S.

Geology

Kinetics of coagulation processes and the growth of particles in a sol. O. M. TODES. *Nauch. Issledovatel. Raboty Khim. Inst. i Lab. Akad. Nauk S.S.S.R. za 1940*, 1941, pp. 120-21; *Khim. Referat. Zhur.*, 4 [9] 24 (1941). M.Ho.

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

CA

2

Kinetics of topochemical reactions. I. Propagation of reactions from plane surfaces. O. M. Todes and R. I. Bogutskii. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 11, 133-9(1941).—Theoretical-math. An equation for the kinetics of the process is derived, and the establishment of a reaction front and the linear velocity of propagation of transformations are discussed. F. H. Rathmann

COMMON ELEMENTS

COMMON VARIABLES INDEX

OPEN

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

AUTHOR INDEX

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

B C

A 1

Theory of thermal explosions. III. Thermal explosions in autocatalytic reactions. P. V. Melenteev and O. M. Todes (*Acta Physicochim. U.R.S.S.*, 1941, **14**, 27—52).—Mathematical. The theory already advanced (A., 1940, I, 28) is extended to cover the case of an autocatalytic reaction.

F. I. G.

COMMON ELEMENTS

MATERIALS INDEX

OPEN

COMMON VARIABLES INDEX

ASA-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

Ca

24

Theory of thermal explosions. IV. Study of the loss of heat in closed vessels for the purpose of determining the explosion constants. O. M. Todes and B. N. Karandin. *Acta Physicochim. U. R. S. S.* 14, 63-70(1941); cf. *C. A.* 35, 7715^{9}.—When convection plays a part in the transfer of heat from a reacting gas to the walls of the vessel, purely math. treatment fails. Accordingly, the cooling of a hot gas has been studied experimentally and an empirical equation connecting functions of various parameters (size of vessel, cond., viscosity, etc.) is given.

B. C. P. A.

COMMON ELEMENTS

COMMON VARIABLES INDEX

OPEN

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

ca

2

Theory of the rate of crystallization processes at decreasing concentration of the crystallizing substances in a homogeneous phase. O. M. Todes. *Bull. acad. sci. U. R. S. S., Classe sci. chim.* 1942, 106-15(English summary); cf. *C. A.* 36, 5412.—Detailed analysis of the case occurring when the rate of nucleus formation falls off rapidly with decrease of supersatn. The distribution curve derived from this case has a peak-like character and is close to the Gauss error curve. G. M. Kosolapoff

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

CA

2

Statistical theory of the adsorption of gas mixtures. S. Z. Roginskii and O. Todes (Acad. Sci. U.S.S.R., Inst. Colloid- and Electrochemistry, Lab. Catalysis, Moscow) *Acta Physicochim. U.R.S.S.* 20, 307-20(1945); cf. *C.A.* 40, 11^{8}.—Math. The statistical theory of the adsorption of gases on complex inhomogeneous surfaces by Roginskii (*C.A.* 39, 5141^{9}) is extended to gas mixts. Using as a basis the Langmuir isotherm, R. discusses probable relations between the heats of adsorption of different gases on the same areas of a complex surface for the cases when the adsorption forces are of different nature. The heats of adsorption may vary in like or in contrary sense or be unrelated. By the method of the detg. band, the adsorption isotherm of individual components and the total adsorption isotherm are derived for binary mixts. for the cases when the heats of adsorption vary in like sense; the adsorption isotherms of the mixts. are expressed explicitly in terms of the adsorption isotherms of the pure components. The conditions and relations governing the mutual displacement of the gases are established for the cases of heats of adsorption varying in the same sense. The effect of the temp., external pressure, and compn. of the gaseous phase on adsorption equilibria and on the po-

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

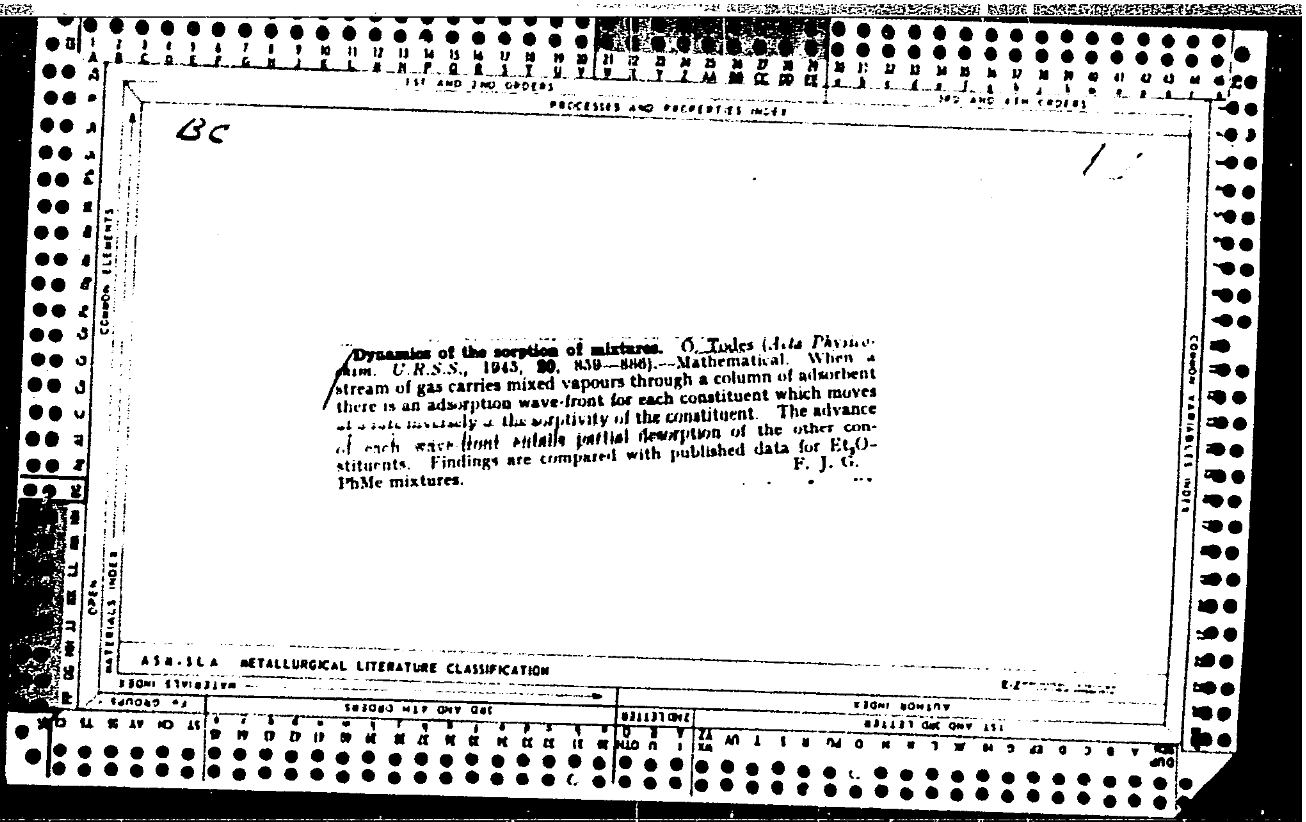
3RD AND 4TH ORDERS

CA

2

Statistical theory of the adsorption of gas mixtures. II. S. Z. Roginskii and O. Todes (Inst. Colloid and Electrochemistry, Moscow). *Acta Physicochim. U.R.S.S.* 20, 695-712(1945).—Math. The theory explained in Part I (cf. *C.A.* 40, 785⁷) is extended to include heats of adsorption which may vary in opposite sense or when they are unrelated. The adsorption isotherms of the individual components of a binary mixt. and of the mixt. as a whole are derived by the method of the detg. band in cases where the heats of adsorption vary in opposite sense and when they are unrelated. In all cases explicit expressions were obtained for the adsorption isotherm of mixts. in terms of the adsorption isotherm of the pure components, and the laws and conditions governing mutual displacement of the components are established. K. F. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION


1ST AND 2ND ORDERS
PROCESSES AND PROPERTIES INDEX
3RD AND 4TH ORDERS
COMMON ELEMENTS
MATERIALS INDEX
COMMON VARIABLES INDEX
OPEN
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION
MATERIALS INDEX
3RD AND 4TH ORDERS
AUTHOR INDEX
1ST AND 2ND LETTER

Bc

1

Dynamics of the sorption of mixtures. O. Todes (*Acta Physicochim. U.R.S.S.*, 1945, **20**, 859—886).—Mathematical. When a stream of gas carries mixed vapours through a column of adsorbent there is an adsorption wave-front for each constituent which moves at a rate inversely ∝ the sorptivity of the constituent. The advance of each wave-front entails partial desorption of the other constituents. Findings are compared with published data for Et_2O-PhMe mixtures.

F. J. G.

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

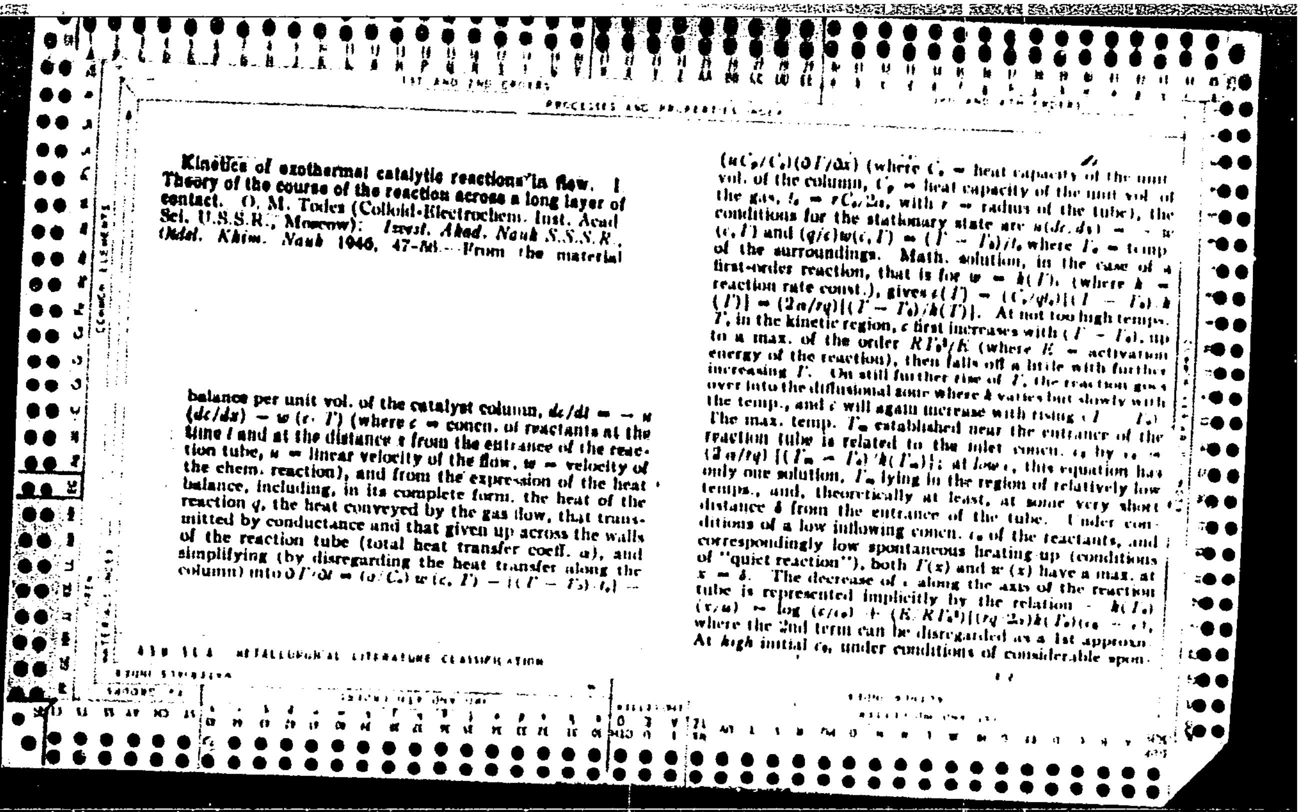
2

Kinetics of catalytic reactions in a flow system. I. Dynamics of processes at constant activity of the catalyst. S. Z. Roginskii and O. M. Todes. *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1946, 331-9.—(1) The starting differential equation $\partial c/\partial t = -u(\partial c/\partial x) - kN(x)f(c)$ (where u = linear velocity of the gas stream calcd. for the packing-free cross-section, c = concn. of reactant, x = distance from the entrance of the reaction space, N = no. of active centers, f = function expressing the order of the reaction, k = chem. reaction rate const.), is transformed into $\partial s/\partial t = -u(\partial s/\partial x) - a(x)s$ by the substitution $s = e^{-B}$ (where $B = \int_{c_0}^{c} dc/f(c)$) and $a(x) = kN(x)$, giving for the stationary state (subscript s) $s_s(x) = e^{-B'/u}$ (where $B' = \int_0^x a(x)dx$), and, taking into account the initial and boundary conditions, and going back to c as variable, for the time-space distribution of the concn.: at $t < x/u$, $c(x, t) = 0$ and at $t > x/u$, $c(x, t) = c_s(x)$, where c_s is detd. by the expression of s_s or by direct integration of the starting equation for $\partial c/\partial t = 0$. At any point of the reaction tube, at any time $t < x/u$, the concn. c of the reactant = 0; at the moment $t = x/u$, the concn. wave carried by the gas stream reaches that point, and the concn. rises instantaneously and discontinuously to $c_s(x)$ and then remains const. (2) In the case of a first-order reaction, $f(c) = c$, $s = c/c_0$, $c_s(x) = c_0 e^{-B'/u}$, and, if the activity of the catalyst is const., i.e. if $a(x) = a_0$, one has $c_s(x) = c_0 e^{-a_0x/u}$, in other words, the stationary concn. falls exponentially along the reaction tube. For a 2nd-order reaction, $f(c) = c^2$, $s = e^{(1/c_0)-(1/c)}$, $c_s(x) = c_0/[1 + (c_0B'/u)]$, and, at const. activity of the catalyst, $c_s(x) = c_0/[1 + (c_0a_0x/u)]$, that is, the fall of the stationary concn. along the tube is hyperbolic. Generally, the higher the order of the reaction, the less drastic is the fall of c_s, or the longer is the zone over which the reaction extends. For the case of a Langmuir-type kinetic law, $f(c) = c/[1 + (c/\gamma)]$, one finds the implicit equation $c_s(x) = c_0 e^{[c_0 - c_s(x)]/\gamma} e^{-B'/u}$, giving, for more distant portions of a sufficiently long reaction tube, $c_s(x) \approx c_0 e^{c_0/\gamma} e^{-B'/u}$. Graphs of $c_s(x)$, at const. a, constructed by the above expressions, show the fall of c_s along the tube, for a reaction governed by a Langmuir-type law, to be intermediate between the line corresponding to zero order (steepest fall) and the 1st-order curve. This type of kinetics holds for cases where adsorption on the catalyst surface is established practically momentarily, and the chem. reaction is of the 1st order with respect to the surface concn. (3) Formally, the effect of the temp., in the case of a 1st-order reaction, finds its expression in the temp. dependence of a "natural scale of length" $\xi = u/kN$ which has the meaning of the distance along which the concn. falls to 1/eth of its initial value. This dependence has the form $\xi \sim e^{J/RT}$ where the energy J may either be identical with the activation energy, or equal to the difference between it and the energy of adsorption, or else involve addnl. energy terms, and can be either pos. or neg. (4) The formal analogy between the

(Fah)

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

change of the stationary concn. as a function of the distance in flow kinetics, and the change of concn. as a function of time in static kinetics, is evidenced by the formulation $dc/d(x/u) = \partial c/\partial t$, the magnitude $x/u = \tau$, the time of contact, playing the same role as the time in static kinetics. In static kinetics, change of temp. changes the time scale, in flow kinetics it changes the space scale of the concn. distribution. N. Thon



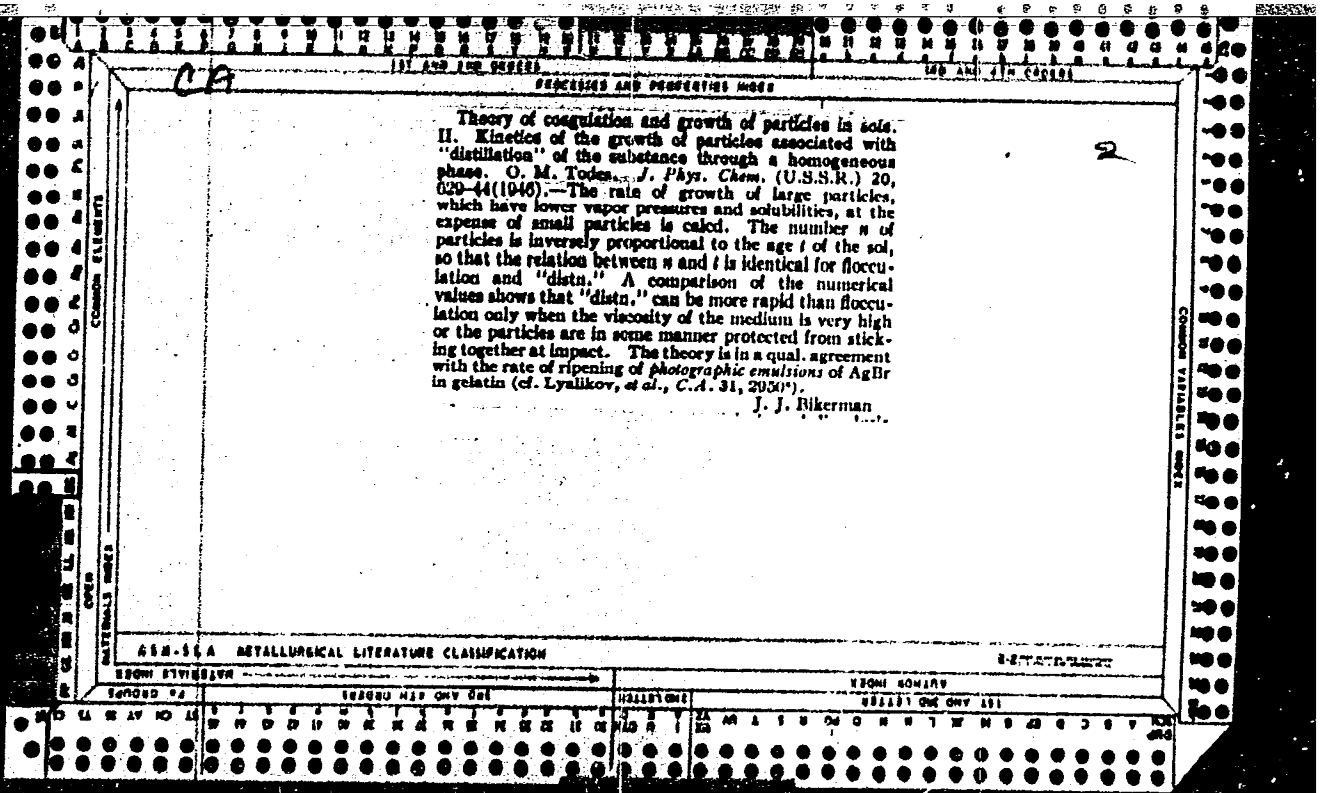
PROCESSES AND PROPERTIES INDEX
METALLURGICAL LITERATURE CLASSIFICATION

Kinetics of exothermal catalytic reactions in flow. I. Theory of the course of the reaction across a long layer of contact. O. M. Todes (Colloid-Electrochem. Inst. Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1946, 47-56.—From the material balance per unit vol. of the catalyst column, $dc/dt = -u(dc/dx) - w(c, T)$ (where c = concn. of reactants at the time t and at the distance x from the entrance of the reaction tube, u = linear velocity of the flow, w = velocity of the chem. reaction), and from the expression of the heat balance, including, in its complete form, the heat of the reaction q, the heat conveyed by the gas flow, that transmitted by conductance and that given up across the walls of the reaction tube (total heat transfer coeff. α), and simplifying (by disregarding the heat transfer along the column) into $\partial T/\partial t = (q/C_v)w(c, T) - [(T - T_0)/t_0] - (uC_p/C_v)(\partial T/\partial x)$ (where C_v = heat capacity of the unit vol. of the column, C_p = heat capacity of the unit vol. of the gas, $t_0 = rC_v/2\alpha$, with r = radius of the tube), the conditions for the stationary state are $u(dc/dx) = -w(c, T)$ and $(q/c)w(c, T) = (T - T_0)/t_0$ where T_0 = temp. of the surroundings. Math. solution, in the case of a first-order reaction, that is for $w = k(T)c$ (where k = reaction rate const.), gives $c(T) = (C_v/qt_0)[(T - T_0)/k(T)] = (2\alpha/rq)[(T - T_0)/k(T)]$. At not too high temps. T, in the kinetic region, c first increases with $(T - T_0)$, up to a max. of the order RT_0^2/E (where E = activation energy of the reaction), then falls off a little with further increasing T. On still further rise of T, the reaction goes over into the diffusional zone where k varies but slowly with the temp., and c will again increase with rising $(T - T_0)$. The max. temp. T_m established near the entrance of the reaction tube is related to the inlet concn. c_0 by $c_0 = (2\alpha/rq)[(T_m - T_0)/k(T_m)]$; at low c, this equation has only one solution, T_m lying in the region of relatively low temps., and, theoretically at least, at some very short distance δ from the entrance of the tube. Under conditions of a low inflowing concn. c_0 of the reactants, and correspondingly low spontaneous heating-up (conditions of "quiet reaction"), both $T(x)$ and $w(x)$ have a max. at $x = \delta$. The decrease of c along the axis of the reaction tube is represented implicitly by the relation $-k(T_0)(x/u) = \log(c/c_0) + (E/RT_0^2)[(rq/2\alpha)k(T_0)](c_0 - c)$, where the 2nd term can be disregarded as a 1st approxn. At *high* initial c_0 under conditions of considerable spon-

taneous heating up, the $c(T)$ equation has 3 solutions,
two of them imaginary and one real, the latter correspond-
ing to the highest T. The reaction takes place in the dif-
fusional region. Schematically, in terms of x, there is a
narrow initial zone of "combustion," of width x_0, where T
is high (attaining up to hundreds of °C.), with a discon-
tinuous drop of T at $x = x_0$ and subsequent slow decrease
along the axis of the reaction tube; c falls rapidly along
the combustion zone, much slower beyond it. The reac-
tion is, in the main, completed within the zone of width
x_0; as a first approxn., $x_0 \approx u/k_d$, where k_d = rate const.
(in the diffusional region, little dependent on the temp.)
at $T = T_m$. The crit. c_m sepg. the region of "quiet reac-
tion" from that of "combustion" is approx. $c_m \approx (RT_0^2/-$
$E)(2a/q)(1/k(T_0))$. II. **Dynamics of processes on
aging catalysts.** *Ibid.* 1946, 483-8.—If the activity a
of the catalyst is a function of time t, specifically, if $a = a_0$
at $t = 0$, $a = a(t)$ and $da/dt < 0$ within $0 < t < t_0$, and
a = const. $= a_f < a_0$ after $t > t_0$, then, for $t > x/u$, one
has, in the case of a first-order reaction, $c(x, t) = c_0e^{-B}$,
where $B = \int_0^t a(\theta)d\theta$ and $\theta = t - (x/u)$. Graphs $c(x)$
and $c(t)$ constructed with the aid of this relation show that,
at $x > ut_0$, a stationary concn. wave of width ut is es-
tablished along the tube; at a given moment t, c decreases
along x from a high c_2 to a low c_1, over a length $\Delta x = ut$,
the values of c_2 and of c_1 decreasing uniformly, each along
its own course, with increasing x. At a given x, c increases
time from c_1 to c_2. From the final concn. c_f at the outlet of
a catalyst column of total length L (provided $L > ut_0$),
one can det. the final const. a_f, reached after $t = t_0$, by the
relation $a_f = -(u/L) \log (c_f/c_0)$. The instant measure
is $a(t) = a_f + d/dt \log c[t + (L/u)]$. In terms of the
temp., if both the rate of aging $1/t_0$ and a_0 increase with
the temp., the integral $\int_0^{t_0} a(\theta)d\theta$ may either increase or de-
crease; if a_0 falls with rising temp., the integral will de-

crease, and c_f increase rapidly. The width of the wave
ut_0 will in all cases decrease with rising temp. Relations
are qualitatively similar for reactions other than first-
order. The formal treatment developed does not depend
on the particular mechanism or nature of the aging of the
catalyst.

N. Thon



1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

CA

2

Theory of coagulation and growth of particles in sols. II. Kinetics of the growth of particles associated with "distillation" of the substance through a homogeneous phase. O. M. Todes. *J. Phys. Chem.* (U.S.S.R.) 20, 029-44(1946).—The rate of growth of large particles, which have lower vapor pressures and solubilities, at the expense of small particles is calcd. The number *n* of particles is inversely proportional to the age *t* of the sol, so that the relation between *n* and *t* is identical for flocculation and "distn." A comparison of the numerical values shows that "distn." can be more rapid than flocculation only when the viscosity of the medium is very high or the particles are in some manner protected from sticking together at impact. The theory is in a qual. agreement with the rate of ripening of *photographic emulsions* of AgBr in gelatin (cf. Lyalikov, *et al.*, *C.A.* 31, 2050^{e}).

J. J. Bikerman

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

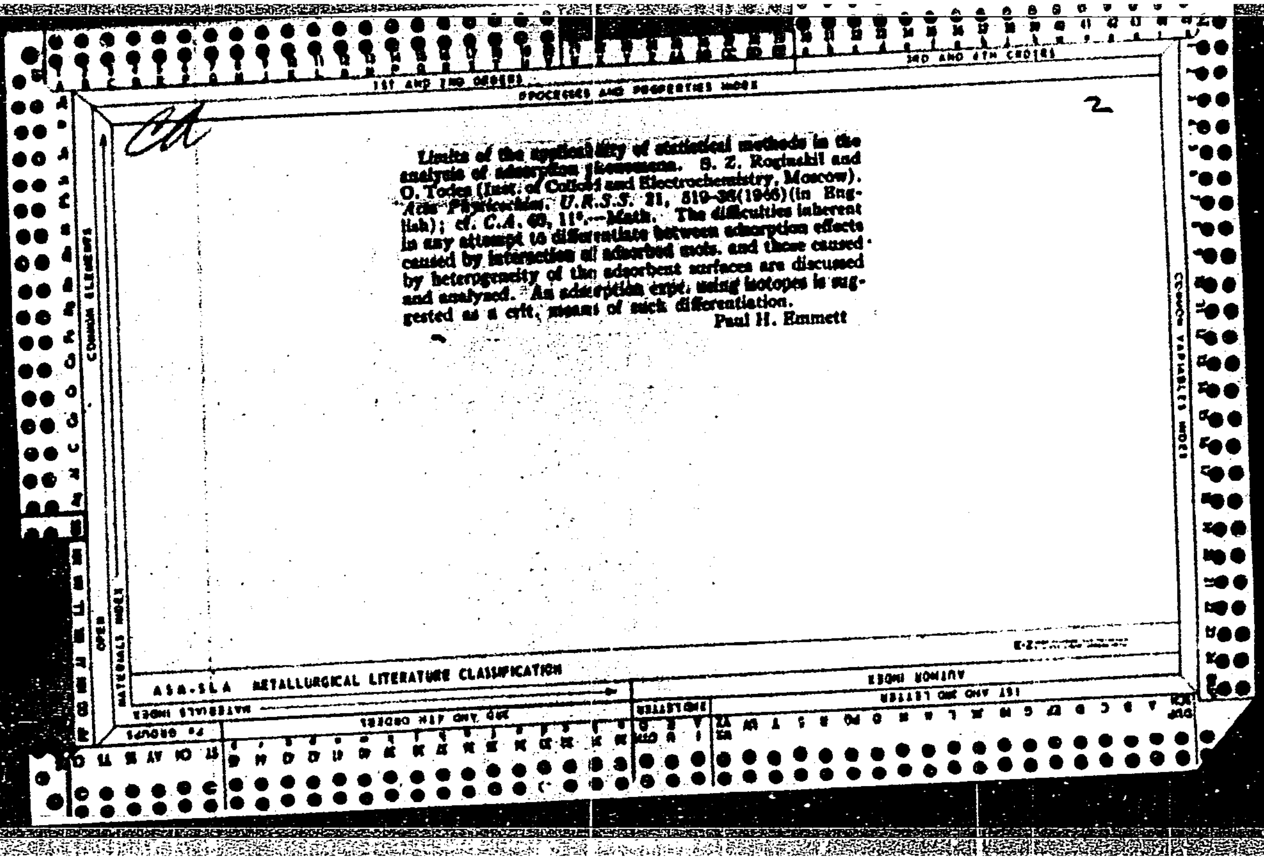
PROCESSES AND PROPERTIES INDEX

CA

2

Kinetics of catalytic reactions in a flow system. III. Dynamics of processes in the presence of catalyst poisons. S. Z. Roginskii and O. M. Todes (Inst. Phys. Chem. Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1946, 475-81; cf. Todes, *ibid.*, No. 5, 463-8.—In the case of a poison carried by the gas stream and adsorbed on consecutive layers of the catalyst column (as distinct from uniform aging of the whole catalyst column, treated in Part II), the distribution of the poison concn. b in the frontal portion of the catalyst, limited by $x < ut$, is expressed by $b(x, t) = b_0e^{-k_0x/u}$ where b_0 = poison concn. at the entrance of the reaction tube. On passing consecutive layers of the column, the rate of sorption of the poison falls continuously. After a sufficiently long time, the curves $b(x, t)$ and $B(x, t)$ (B = amt. of poison adsorbed per unit vol. of the catalyst), will shift along the tube without changing their shape. Substituting the variable $\xi = x - vt$, where v = velocity of propagation of the sorption wave; one finds $v = ub_0/(B_s + b_0) \approx ub_0/B_s$, where B_s = amt. of poison adsorbed at satn. The fraction χ, expressing the final fall of the initial activity a_0 of the catalyst, falls with increasing b_0 along a curve of the shape of a reversed adsorption isotherm, or more steeply, depending on whether the activity decreases gradually with increasing coverage of the surface, or if the loss of activity occurs chiefly on sorption of the 1st portions of the poison. Designating by N and N_0 resp., the no. of active centers at x, t, and at the outset (before poisoning), by α the no. of poison mols. necessary to inactivate one center, R. and T. show that $v = u/[1 + (\alpha N_0/b_0)]$; the product αN_0 is termed the poison capacity of the catalyst. With increasing b_0, v increases, tending to the limit $v = u$ at very high b_0. For a first-order reaction, the final expressions for the distribution of the concn. of the reactant are: at $0 < x < vt$, $c(x, t) = c_0\exp.(-\chi a_0 x/u)$; at $vt < x < ut$, $c(x, t) = c_0\exp.\{(-a_0x/u) + [(t - (x/u))(1 - \chi)a_0v/u(u - v)]\}$, and, at $x > ut$, $c(x, t) = 0$. The head of the wave, with a low concn. of the reactant, moves along with the gas stream with the velocity u. The tail of the wave, where the concn. of the reactant has reached its final value, moves at the considerably lower velocity v. The width of the wave $= (u - v)t$ increases proportionally to the time. N. Thon

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION



1ST AND 2ND ORDERS
PROCESSES AND PROPERTIES INDEX
3RD AND 4TH ORDERS
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION
AUTHOR INDEX
MATERIALS INDEX

Ca

2

Limits of the applicability of statistical methods in the analysis of adsorption phenomena. S. Z. Roginskii and O. Todes (Inst. of Colloid and Electrochemistry, Moscow). *Acta Physicochim. U.R.S.S.* 21, 519-38(1946)(in English); cf. *C.A.* 40, 11*.—Math. The difficulties inherent in any attempt to differentiate between adsorption effects caused by interaction of adsorbed mols. and those caused by heterogeneity of the adsorbent surfaces are discussed and analyzed. An adsorption expt. using isotopes is suggested as a crit. means of such differentiation.

Paul H. Emmett

CA

PROCESSES AND PROPERTIES INDEX

2

The kinetics of exothermal catalytic reactions in a current. II. Theory of reaction on a short contact layer. Ya. L. Margolis and O. M. Todes (Inst. Phys. Chem., Moscow). *Acta Physicochim. U.R.S.S.* 21, 883-98 (1946)(in English); cf. *C.A.* 41, 1537*c*.—Theoretical-math. Equations are derived for a comparatively short reactor at not too small rates of flow. Two steady regimes, "quiet reaction" and "combustion regime," are established as in the previous case. For an unsteady extinction regime, the rate of cooling of the reactor and the activity of the catalyst can be connected by an almost linear relation; this permits the development of a simple method of evaluating the relative activities of catalysts for a given reaction. Arthur Fleischer

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

27

B

Kinetics of Catalytic Oxidation in a Stream. Oxidation of Iso-Octane. L. Ia. Margolis and O. M. Todes. 7 pages. Battelle translation from *Reports of the Academy of Sciences of U.S.S.R.*, v. 52, no. 6, 1946, p. 519-522.

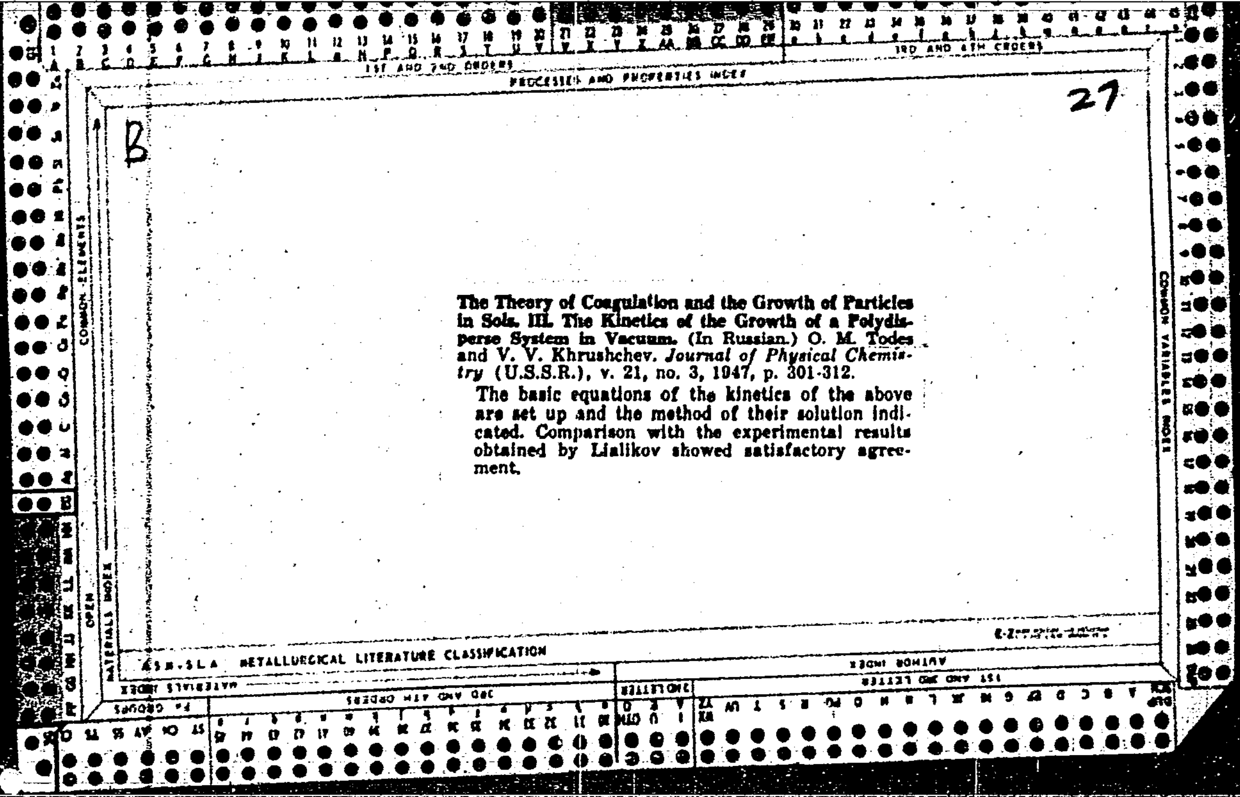
The kinetics of the above reaction were studied using laboratory equipment, which is described. Specific rate constants and activation energies were obtained from the experimental results using platinum, palladium, and various compounds having spinel-type structures, for example, nickel chromite, iron aluminate, etc., as catalysts. Results are tabulated, plotted, and discussed.

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION

TODES, O. M.

Kinetics of exothermal reactions in streaming gas. III. Kinetics of catalytic combustion of isoöctane and of cyclohexane. L. Ya. Margolis and O. M. Todes. *Bull. acad. sci. U.R.S.S., Classe sci. chim.* 1947, 443-52(in Russian); cf. *C.A.* 41, 3350*h*.—Combustion of flowing mixts. of 2,2,4-trimethylpentane (I) and of cyclohexane (II) with air were carried out between 250° and 660° over spinel-type catalysts (chromites, aluminates, manganites, etc.) on asbestos, at concns. varying between 0.1% and 67%, so as to ensure a convenient rate of combustion; chromites were prepd. by decompn. of the chromates, aluminates by fusing salts of Al and the desired metal; combustions of I were also carried out over Pt and Pd (0.05–0.1%) on asbestos. In all cases, the combustions led to practically pure CO_2 and H_2O; in no case was a trace of CO detected; the H_2O contained no more than 0.01% aldehydes and 0.02% acids. Without catalysts, oxidation of I began only at 600-650°, that of II somewhat lower. Doubling of the initial concn. c_0 (in vol. %) of I or II in the mixt. doubles the degree of combustion; hence, the reaction is of the 2nd order. With a given catalyst, $k = [(c_0/c) - 1]/b_0 c_0 \tau$, where b_0 = vol. % O_2 (=21), τ = time of contact in min., is const. at const. temp., independently of c_0 and of τ; on the other hand, k is directly proportional to the concn. c' of the catalyst: $k = k'c'$ (k' = sp. rate const.); thus, k' characterizes the activity of the given catalyst at the given temp. As a function of temp., between 250° and 650°, $k' = Ae^{-E/RT}$ as usual, with the numerical values (catalyst, hydrocarbon, E in kcal./mole, log A): Mg chromite + MgO (I) 45, 17; (II) 37.8, 16.4; Fe chromite + Fe_2O_3 (I) 30, 11; Ag manganite (I) 27.8, 10; Cu (or Fe) aluminate (I) 16.2, 6; Cu chromite + CuO (I) 15.5, 6; (II) 17.6, 6.5; the same Pb-promoted (I) 36.4, 14; (II) 33, 13; Cu chromite (I) 15.10, 7; Pt (I) 13.5, 9; Pd (I) 16, 11. The reaction is evidently wholly detd. by the kinetic region, not by diffusion. The independence of the rate of the concn. of O_2 indicates almost complete coverage of the active surface with O_2, whereas the 2nd order might indicate bimol. activated complexes. With regard to E and A, the catalysts fall into 3 groups, those with $E \approx 45$, 30, and 15; it is noteworthy that, owing to a high A, some catalysts of the 1st and 2nd groups are not any less active at a higher temp. than those of the 3rd group. That the very marked variation of A from 10^6 to 10^{17} cannot be ascribed to differences in surface area was shown by electron-microscopic examn.; in particular, the high value of A for Pt and Pd (as compared with the catalysts of the 3rd group) is unexplained. Promotion with small amts. of Pb strikingly raised E from 15.5 to 40 and A from 10^6 to 10^{14}.

N. Thon



1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

27

B

The Theory of Coagulation and the Growth of Particles in Sols. III. The Kinetics of the Growth of a Polydisperse System in Vacuum. (In Russian.) O. M. Todes and V. V. Khrushchev. *Journal of Physical Chemistry* (U.S.S.R.), v. 21, no. 3, 1947, p. 301-312.

The basic equations of the kinetics of the above are set up and the method of their solution indicated. Comparison with the experimental results obtained by Lialikov showed satisfactory agreement.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

2

PROCESSES AND PROPERTIES INDEX

**Kinetics of exothermal catalytic reactions in a flow
system. IV. Investigation of the stationary and the
nonstationary oxidation of isoöctane on a copper-chro-
mium catalyst.** L. Ya. Margolis and O. M. Todes (Inst.
Phys. Chem. Acad. Sci. U.S.S.R., Moscow). *Izvest.
Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1948, 174-81;
cf. *C.A.* 42, 1794*b*.—Measurements of the temp. estab-
lished in the oxidation of isoöctane, flowing at the rate of
40 l./hr., on Cu-Cr catalysts with 10, 30, and 67% active
contact substance on asbestos, are compared with theo-
retical expressions derived for the stationary and the non-
stationary state. (1) Experimentally the loss of heat
through convection by the gas stream is only 5-9% of the
total heat balance; the main loss of heat occurs through
the walls of the reaction tube. The stationary temp. rise
ΔT, established on equality of the rate of evolution, Q, of
the heat of reaction, and the rate of loss of heat, is detd.
by $\Delta T = (Q/C)\tau$, where C = heat capacity of the reac-
tion, τ = "characteristic time," or "relaxation time"; the
same magnitude τ dets. the rate of cooling on shutting off
the external source of heat, $\Delta T = \Delta T_0 e^{-t/\tau}$ (t = time).
The magnitude τ can thus be detd. experimentally, either
from the stationary or the nonstationary state; for a
cylinder of radius r, heat exchange coeff. α, heat capacity
per unit vol. C, $\tau = rC/2\alpha$; with $\alpha \sim 10$ kcal./sq. m./hr./
degree, $C \sim 0.45$ cal. (asbestos), $r = 1.1$ cm., τ should be of
the order of 5 min. Exptl. data confirm the linearity of
log (ΔT) as a function of t for the nonstationary state,
independently of the rate of flow (16, 27, 44 l./hr.), giving
a const. $\tau \sim 2.5$ min. in the temp. range 100-400°, de-
creasing from 2.5 to 0.5 between 400 and 600°; from sta-
tionary-state measurements, $\tau \sim 2$ min. (2) With T_0 =
initial temp. of the reaction space, q = heat of the reac-
tion, k = chem. reaction rate const., $\Delta T = T - T_0$ and
$\Delta T_m = T_m - T_0$, momentary and max. temp. rise, resp.,
c_0 = initial concn. of isoöctane, the rate of temp. rise is
$(dT/dt)^+ = (q/C)\, kc_0^2\, [1 - (\Delta T/\Delta T_m)]$, the rate of the
fall of temp. due to loss of heat is $(dT/dt)^- = \Delta T/\tau$;
the rate of temp. rise depends relatively little on T_0.
Graphs show that, at c_0 = 1.4%, the curves of fall of temp.
corresponding to various T_0 (from 13 to 400°) intersect
the curve of rise of temp. at a T very close to T_0 (= 400°);
in other words, in the stationary state, ΔT is small, and the
reaction takes place in the kinetic range. However, at a
somewhat higher c_0 = 1.7%, this is true only for $T_0 <$
400°; at $T_0 > 400°$, the curves of $(dT/dt)^+$ and $(dT/dt)^-$
are practically tangent, in other words the reaction passes
into the diffusional range, takes place almost completely
in the narrow region at the entrance of the reactor, and the
temp. rises sharply. These conclusions were confirmed by
expt.; at T_0 = 400°, oxidation of isoöctane (on a 10%
Cu-Cr catalyst) can be kept at the "quiet reaction"
stage, and prevented from becoming a "heterogeneous
combustion," only if c_0 is kept low (<1.7%). With a
30% Cu-Cr catalyst, at c_0 = 1.7%, the reaction is of the
"quiet reaction" type only below $T_0 < 300°$, with a 67%
catalyst at still lower T_0; in the latter case, the kinetics
of the quiet oxidation cannot be detd., inasmuch as below
$T_0 < 250°$, the kinetic reaction is too slow, and above
$T_0 > 250°$ it passes immediately into the diffusional range.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

TODES, O. M.

FA 9/49T10

USSR/Chemistry - Organic Compounds Jun 48
Chemistry - Oxidation, Catalysis of

"Catalytic Oxidation of Various Types of Organic Compounds in a Stream," L. Ya. Margolis, O. M. Todes, Inst of Phys Chem, Acad Sci, Sec of Catalysts and Fuel Chem, 7 3/4 pp

"Zhur Obshch Khim" Vol XVIII (LXXX), No 6 p.1043

Studies complete oxidation kinetics of various hydrocarbons on spinel catalysts and platinum. Reaction constant varies in accordance with Arrhenius' Law over a wide temperature range. Submitted 7 Apr 1947.

[redacted] 9/49T10

CA

2

Theory of adsorption equilibria on nonhomogeneous surfaces. O. M. Todes and A. K. Bondareva. *Zhur. Priklad. Khim.* (J. Applied Chem.) 21, 693-707(1948).—On the assumption that exptl. deviations from Langmuir's adsorption isotherm are detd. by heterogeneity of the surface, and with disregard of interaction between adsorbed mols., integral equations are established for the distribution function $n(b)$, where n = relative fraction of portions of the surface with values of the sorption coeff. b between 0 and b, the latter defined by the application of Langmuir's equation to a single portion of the surface, considered homogeneous, in the form $\Phi_b(p) = p/(p + b)$, where p = partial pressure of the adsorbable substance, and $b = b_0e^{-Q/RT}$, with Q = heat of adsorption on the given portion. The total surface coverage $\Phi(p)$ as a function of p is then given by $\Phi(p) = \int_{b=0}^{b=\infty}[p/(p + b)]dn(b)$, or by $\Phi(p) = \int_0^\infty[p/(p + b)]\rho(b)db$, where $\rho = dn(b)/db$. Solution of these integral equations may be sought by choosing an empirical function $\Psi(b)$ which agrees best with exptl. pairs of values Φ, p, equating $\Psi(p) = \Phi(p)$, and then finding the exact solution analytically. In conclusion of a thorough discussion of purely math. techniques for solving this type of equation, preference is given to Roginskii's approxn. (*C.A.* 39, 5150^3; 41, 19g) consisting in the substitutions $x = \ln p$, $f(x) = \Phi(e^x)$, $\xi = \ln b$, and $\varphi(\xi) = \rho(e^\xi).e^\xi$, and breaking off the Taylor series development $\varphi(\xi) = f'(x)$ . . . after the 1st term. The approxn. of Zel'dovich (*C.A.* 39, 6485^4), based on $\rho(b) = b.d^2\Phi(b)/db^2$, requiring 2 consecutive graphic differentiations, is less convenient. Very complete exptl. data, extending up to surface coverages Φ close to unity, permit the use of developments by Laguerre and Hermite polynomials.

N. Thon

TODES, O. M.

PA 35/49T13

USSR/Chemistry - Drops, Vapor Pressure of Sep 48
Chemistry - Drops, Volume of

"The Theory of the Movement of a Drop in an Upward Flow of Unsaturated and Saturated Air Currents and Its Possible Application in Meteorology," B. V. Deryagin, Corr Mem, Acad Sci USSR, O. M. Todes, Lab of Surface Forces, Dept of Catalysis, Inst Physicochem Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXII, No 1

If a drop has an equilibrium vapor pressure P_o, different from vapor pressure p of the surrounding medium, then two processes will occur simultaneously: the

[redacted] 35/49T13

USSR/Chemistry - Drops, Vapor Pressure of (Contd) Sep 48

fall of the drop and a change in its radius r. Considers these phenomena jointly to reach some conclusions on sharpness of upper and lower layers of clouds, and fact that there are two groups of drops, distinguished by their radii and directions (but not magnitudes) of speeds in any intermediate height. Submitted 7 Jul 48.

[redacted] 35/49T13

~~O.M. Todes.~~

TODES, O.M.

Kinetics of coagulation and flocculation of particles in sols. O. M. Todes. *Problemy Kinetiki i Kataliza 7, Statist. Yavleniya Geterogen. Sistem. Akad. Nauk S.S.S.R.*, 137–73 (1949).—A theoretical analysis of the kinetics of coagulation and distn. shows that the initial stage of the process depends largely on the state of the sol and its dispersion. After a period of time, when the no. of particles in the sol decreases in comparison with the no. in the initial stage, the kinetics of the process no longer depend on the initial state, and the kinetic curves become asymptotic in form. The asymptotic nature of the curves for the distribution of particles with respect to their size is the same for the case of coagulation and distn. The consts. for the rate of coagulation are detd.

J. Rovtar Leach

MCT

①

Kinetics of the catalytic oxidation of hydrocarbons. L. Ya. Margolis and O. M. Todes. *Problemy Kinetiki i Kataliza, Akad. Nauk* ~~S.S.S.R. 4,~~ *Geterogennyi Kataliz*, 281-92(1940). Catalytic oxidation of [illegible], C_6H_{14}, C_6H_{12}, isooctane (I), cyclohexane (II), Me cyclohexane (III), and C_6H_6 to CO_2 and H_2O was studied between 300 and 600° in the presence of Pt, Mn dioxide (IV), and Cu chromite (V) catalysts. [illegible] aldehydes and acids were detected in the products. The oxidation was 2nd order for I, II, and III, 1st order for the normal, aromatic, or olefinic hydrocarbons. The 2nd-order reactions had apparent activation energies, *E*, of 15-45 kcal. Each of the 1st order reactions exhibited 2 values of *E*; a higher one (8-46 kcal.) at lower temp., and a lower one (2.7-5.5 kcal.) at higher temp. An abrupt change in *E* occurred in the vicinity of 350°. The pre-exponential factor, K_0, remained const. when the flow rate was increased by a factor of 6; both *E* and K_0 varied considerably above 350° with a change in the type of hydrocarbon used. These and other indications show that the rates above 350° are not diffusion-controlled. It is proposed that at higher temp. the oxidation is preceded by cracking. In case of I, oxidation became diffusion-controlled at 700-800°; between 250 and 550° it was 2nd order in the presence not only of IV and V, but also of Pt, Pd, and spinel-type catalysts. *E* (kcal.) was 15 with IV, 30 with Fe chromite, and 15 with V, Pt, and Pd; log K_0 was linearly dependent on *E* (Pt fell out of line) and on $1/T$. Because of the latter correlation, contact catalysts which are relatively inefficient at lower temp. may surpass others at higher temp. Sparingly volatile inorg. compds. such as H_3PO_4, H_3BO_3, H_2SO_4, $BaSO_4$, and Na_2SiO_3, when added to IV and V in amts. of 0.5-10%, decreased the order of the reaction. At concns. of approx. 2%, they promoted the catalyst and raised both *E* and K_0;

(over)

3

[illegible] 2/2

larger addns. poisoned the catalyst and lowered E and K_0. The linear dependence of log K_0 on E and $1/T$ held also for the promoted or poisoned catalysts, so that the same additive could act either as a promoter or a poison, depending on the reaction temp. Oxygenated compds. such as MeEtCO, butyric aldehyde, and Et_2O, yielded other O compds., rather than CO_2 and H_2O, on contact with IV and V. It is proposed that the catalytic as well as the homogeneous oxidation of O compds. proceeds through unstable intermediates which are not aldehydes or ketones but may be peroxides. Under the same conditions, AcOH yielded CO_2 and H_2O. Andrew Dravnieks

G. M. [illegible] *Problemy Kinetiki i Kataliza 7, Statist.* [illegible] *Sistem., Akad. Nauk S.S.S.R.* 71 [illegible] (1949) [illegible]

[illegible]

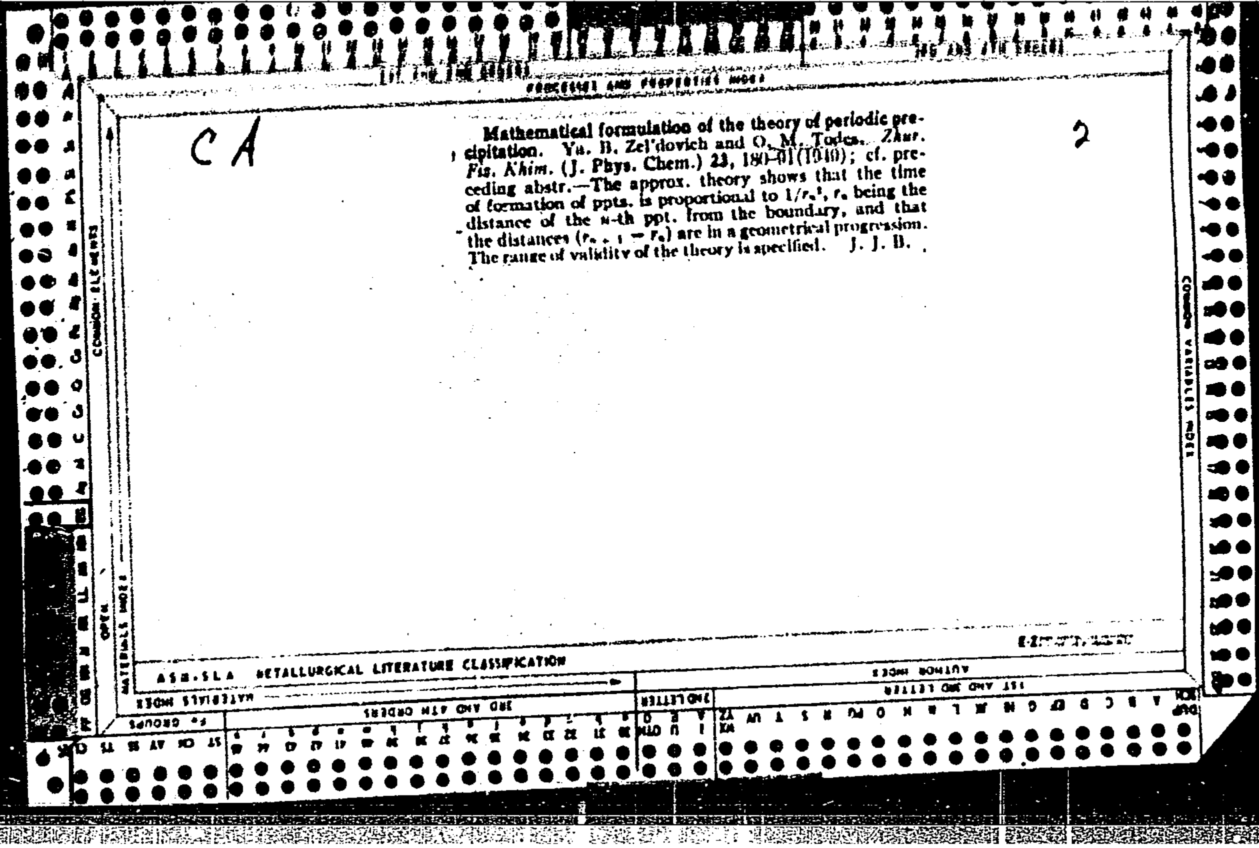
...ous emergence of new crystn. centers continues throughout almost the entire process of forming the sol. The abs. value for the rate of crystn. in this case is [illegible] expt. [illegible]

The limits of applicability of statistical methods in the analysis of adsorption phenomena. S. Z. Roginskiĭ and O. M. Todes. *Problemy Kinetiki i Kataliza* [illegible] *Nauk S.S.S.R.* [illegible] —A [illegible] adsorption on a surface show significant deviation from the Langmuir equation which was developed with the assumption that the surface is homogeneous and that there is no interaction of the [illegible] effect of surface heterogeneity [illegible] isotherms and kinetic curves for [illegible] tion, etc. Mathematically this requires the solution of certain 1st order integral equations. [illegible] methods for the solution of this statistical problem were proposed; the method of [illegible] However [illegible] to represent several important phenomena in adsorption and heterogeneous catalysis. A series of [illegible] relations [illegible] were deduced for these phenomena which [illegible] heterogeneity of the surface [illegible]

[illegible]

[illegible] surface [illegible]
[illegible] the [illegible]
[illegible] and the [illegible]
detd by the method of the [illegible]

of temp., external pressure, and compn. of the [illegible]
the adsorption equil. was established [illegible]


PROCESSES AND PROPERTIES INDEX
COMMON ELEMENTS
COMMON VARIABLES INDEX
MATERIALS INDEX
OPEN
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION
AUTHOR INDEX
1ST AND 2ND LETTER
2ND LETTER
3RD AND 4TH ORDERS
GROUPS

CA

2

Mathematical formulation of the theory of periodic precipitation. Ya. B. Zel'dovich and O. M. Todes. *Zhur. Fiz. Khim.* (J. Phys. Chem.) 23, 180–91(1949); cf. preceding abstr.—The approx. theory shows that the time of formation of ppts. is proportional to $1/r_n^2$, r_n being the distance of the *n*-th ppt. from the boundary, and that the distances $(r_{n+1} - r_n)$ are in a geometrical progression. The range of validity of the theory is specified. J. J. B.

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3

Principles of x-ray dispersion analysis of polycrystalline materials. G. A. Khachkuruzov and O. M. Todes. *Doklady Akad. Nauk S.S.S.R.* **66**, 77-9(1949).—On the basis given by Guinier (*C.A.* **33**, 9130^4) of x-ray diffraction at very small angles a calcn. is made with the practical aim of the x-ray detn. of particle sizes in polydisperse systems. This method is not restricted to the examn. of colloids in the usual meaning; it also is useful for the study of polycryst. aggregates. The intensity of the interference lines is discussed as a function of the size distribution, expressed in a La Place integral equation. The practical evaluation needs the accurate knowledge of the intensity changes in the neighborhood of the interference max. Photographic methods are not sufficiently accurate. Geiger counter evaluation may be helpful (cf. Jellinek, *et al.*, *C.A.* **40**, 3052^9). The enumeration of the La Place integral equation mentioned can be approximated by graphical methods, e.g. that of S. Z. Roginskii and Jellinek. For the absorption of the x-rays in the irradiated vol., the aperture of the rays, and other factors connected with the app. used, special corrections must be applied.

W. Eitel

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

TODES, O. M.

USSR/Minerals - Crushing

Jul 50

"Concerning the Theory of Rock Crushing," B. M. Zvyagin, R. B. Rozenbaum, O. M. Todes, A. Z. Yurovskiy, Inst of Fuel Resources, Acad Sci USSR

"Iz Ak Nauk SSSR, Otdel Tekh Nauk" No 7, pp 1062-1070

Develops method for analytical calculation of relation between composition of crushed particles degree of crushing. Method permits finding function of distribution of crushed particles according to composition in process of find curshing. Submitted by Acad A. M. Terpigorev.

168T56